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Budget Help for Industry

MR. R. A. BUTLER'S Budget on Tuesday carried further the policy of stimulating effort and enterprise which was in evidence last year in the shape of personal incentives. This time his proposals have wider effect, for the reduction of 6d. in the annual rate of income tax and the repeal as from January 1 next year of the Excess Profits Levy are two valuable reliefs for industry, while the restoration of initial allowances on capital expenditure will help all kinds of essential development and expansion. These initial allowances on capital expenditure, beginning at once, are at the rate of 10 per cent for industrial buildings, 20 per cent for plant and machinery, and 40 per cent for mining works, and they have coincided with the announcement of sustained high steel production figures. Last month's output rate of 351,000 tons a week substantially exceeded the previous best monthly figure of 329,800 tons a week in March, 1950. There has been evidence for some time that the materials for development will be available, and now the means is being given to use them provided allocations keep pace with events. Actual tax concessions to industry this year total £45 million. On the personal plane, also, the Budget has recognised the need for stimulus in the medium and higher income ranges to which attention was drawn in a memorandum issued earlier this year by the Federation of British Industries, wherein the value of the 1952 incentives was acknowledged, but it was pointed out that only relatively small incomes were affected materially. This year the incentives have been more widely spread and should ensure a more receptive hearing in all quarters for the campaign now being undertaken by the British Productivity Council. Purchase tax reductions also make their contribution to industries having such wide-ranging requirements as transport. The principal relief which had been widely urged, but has not materialised, is a reduction in fuel oil duty, a tax whose effect on London Transport was one of the first factors mentioned by Lord Latham when announcing lodging of the B.T.C. Passenger Charges Scheme, 1953, in January.

Increase in Winter Railway Freight

IT has been stated this week that last winter British Railways' freight traffic was heavier than in any winter since the war. A comparison of the statistics for the 24 weeks from September 8, 1952, to February 22, with those for the corresponding period of 1951-52, however, shows that merchandise tonnage decreased by 2,118,000 tons, while 752,000 more tons of minerals and 1,744,000 tons of coal and coke were carried. Total tonnage was thus 378,000 tons greater, but the change in the nature of the traffic reduced the amount of work falling on the railways. Merchandise loads to 4 tons a wagon, often requires handling by the railway staff, and its average haul is long. Minerals and coal pass in wagon loads of 11½ tons for shorter distances. This winter 424,000 fewer wagons of merchandise were forwarded and only 159,000 more wagons loaded with minerals or coal, so that the railways dealt with 265,000 fewer loaded wagons. The average length of haul for all traffc was shorter in each 4-week period this winter except in February. Net ton-miles consequently declined by 295 million, or 2·7 per cent, freight train-miles were cut by 914,000, or 1·3 per cent, and freight engine hours in traffic were reduced by 615,000, or 3·4 per cent. These figures confirm our view that there was no special pressure on railway facilities last year.

Production and Transport

THE British Productivity Council last month held a conference with members of the specialist teams which had toured the United States under the auspices of the former Anglo-American Council on Productivity. A statement of objectives was issued after the meeting, in which the necessity for critical examination of present methods of working and organisation in industry was urged. Mr. Frank Gilbert, Principal Staff Officer of the British Transport Commission, who visited the United States with the Specialist Team on Training, discussed the implications of the conference in an address to the Institute of Transport in Northampton on March 26. In the long run, he said, productivity must come mainly from continual improvement and extension of the physical means of production and distribution. Transport came into the picture not only because production in its own workshops provided the physical means of distribution, but because its smooth functioning was essential for the movement of workers, products, and materials to and from the factories. The necessary foundation for both activities was training, and Mr. Gilbert described some of the training methods adopted by the British Transport Commission. His conviction that increased productivity is an attitude of mind reinforces the importance he attributed to originality and imagination in training schemes.

Marylebone for Scotland

THE send-off last Friday of the first of the "Starlight Special" Anglo-Scottish cheap fare trains from London was more than the launching of a venture with potentialities for attracting travellers to the railway. It was also the first departure from Marylebone of a regular passenger service to Scotland. The pre-war night trains to Newcastle seemed to realise the former G.C.R. aspirations

which led to a proposal in 1899 to acquire powers for a line from Beighton to Rotherham, as a "cut-off" to York and beyond. Perhaps the "Starlight Special" gives a clue to the ultimate motive of the Beighton-Rotherham project, which met with strong opposition and was dropped because insistence on it might have held up more essential works. On Friday the train from Marylebone was headed by the "A3" Pacific *Enterprise*, a name appropriate to an occasion which wished success both to the Marylebone-Edinburgh train at 10.5 p.m., and to the companion Glasgow service from St. Pancras at 11 p.m. The smart appearance of the rolling stock and the attractive display of refreshments in the all-night buffet car (offering also a 3s. 6d. breakfast) set a standard which it will be essential to maintain if there is to be effective competition with cheap motorcoach travel.

Overseas Railway Traffics

ANTOFAGASTA (Chili) & Bolivia receipts rose from £93,994 for the last week in January to £120,455 for the last week in February, and then dropped again, being £92,465 for the week ended April 3; a "low" of £72,426 in the third week of February is explained by three days' holiday in Bolivia, but no explanation is forthcoming of the low receipts of £78,481 for the corresponding week of March. Traffics for the corresponding period of 1952 rose from £103,426 to £125,293 for the week ended March 27, and fell again to £104,916 the following week, with the Bolivian holiday to account for the £82,479 for the fourth week in February. Whilst the Bolivian conversion rate has been roughly the same this year and last (Bs. 170 to the £), the Chilean rate in February and March of 1952 remained at Ch. $230.60 and this year fell steadily from Ch. $330.60 at the end of January to $339.60 for the week to April 3. Traffic on this as on other railways in this part of South America tends to fluctuate sharply. Nevertheless the aggregate receipts since January 1 last have lagged somewhat behind those of last year; as at April 3, they were £1,217,468 compared with £1,380,642 at the corresponding date in 1952.

U.S.A. Railway Construction in 1952

THE mileage of new lines completed in the United States during 1952—116½ miles—has been exceeded three times only in the last twenty years, and by small margins. In addition, 34 miles of second track and six miles of fourth track were laid. The new lines included the "Centennial Cut-off," which gives the Chicago, Burlington & Quincy new high speed access to Kansas City, and an extensive relocation scheme on the Southern Pacific, caused by the building of the Lookout Point dam in the Willamette River. Some of the greatest expenditure has been on the construction of new mechanised marshalling yards, among them the Radnor yard of the Louisville & Nashville at Nashville ($10,500,000), the Ernest Norris yard of the Southern at Birmingham ($9,200,000), and the Roseville yard of the Southern Pacific near Sacramento ($4,700,000). These projects are overshadowed by the Pennsylvania Railroad plan to spend $31,000,000 in extending and modernising its Conway Yard at Pittsburgh, on which work has now begun. Another large project, to be completed in 1954, is the publicly-owned Union Passenger Terminal at New Orleans, whose construction is well advanced. In addition, it is likely that the new lines now under construction in the U.S.A., and to be opened this year, will exceed by a substantial mileage those opened in 1952.

Resistance of Rails to Shelling

FURTHER information is becoming available as to the value in increased wear given by heat treatment on the use of manganese-chrome-vanadium alloy steel rails in the U.S.A. In some recent tests on the Duluth, Missabe & Iron Range RR., which carries an extremely heavy ore traffic in trains of 180 loaded bogie wagons, hauled by some of the most powerful articulated locomotives in North America, certain heat-treated rails were still in service on the high side of a 43-ch. radius curve after 228,950,000 tons of traffic had passed over them, whereas untreated rails had been removed after carrying 121,000,000 tons, owing to shelling and the development of other defects. In a curve of 21-ch. radius, heat-treated rails carried 238,000,000 tons of traffic, as compared with 125,000,000 tons only by untreated rails. The resistance made possible by heat treatment is mainly to shelling; a comparison between the two types on the low side of curves shows a considerably less marked difference, as the low rails are subjected more to direct pressure than the grinding action suffered by the high rails. No information is available as to whether or not the heat-treated rails develop irregular surface hardening; though as this is a low-speed non-passenger route, it would probably be of little moment if they did.

Alternating Current Traction Motors

IN this year's edition of *L'Année Ferroviaire* Monsieur Garreau, Chief Electric Traction Engineer of the French National Railways, makes an interesting comment on the series traction motor for single-phase alternating current. He observes that this is the only one of the main types of a.c. motor in which the transformer effect, far from being put to good use, is a positive disadvantage. In spite of this, motors depending on a.c. phenomena have never constituted a lasting challenge to the series machine for traction, although the only major a.c. electrification in Great Britain—that of the L.B.S.C.R.—in its early years used a purely a.c. motor. This was the Winter-Eichberg compensated repulsion motor, in which the armature current is induced by transformer action between the stator and the armature, and the driving flux is provided by the current from the secondary of a small transformer in series with the stator. This excitation current flows through the armature between two brushes at right angles to the normal short-circuited pair of the repulsion motor. In the L.B.S.C.R. stock the motor stator coils were connected to a main step-down transformer, with tappings on the secondary and on the stators themselves for speed control. Similar motors have been used for traction, however, with their stators connected directly to a 6,000 V. line.

S ientific Methods in Modern Construction

TO enable its "Kansas City Zephyrs" to traverse the new 70-mile chord line from Brookfield to Maxwell at high speeds within three months of its opening for freight traffic, the Chicago Burlington & Quincy Railroad took many special measures in the construction. For instance, a whole-time soils analyst with a field laboratory was employed on the work throughout the construction period, and specialist advice was also obtained from a soils consultant, who visited the work frequently. Two boring plants were used to ascertain subsoil conditions, and the nature of the different soils and their moisture contents were carefully studied. The most suitable side-slopes for cuttings and embankments could thus be fixed and a nearly-perfect consolidation of banks was possible. Earth fill was spread in 8-in. layers, each compacted by at least six sheepsfoot rollings; rock-fill was dumped in 3-ft. layers. For banks up to 15 ft. high a 24-ft. formation width was used, but for higher banks it was suitably increased. Precision drilling and shot-firing ensured economy and stability in rock-cutting side-slopes. All these precautions, involving a thorough study and application of soil mechanics, have resulted in an initially first-rate piece of construction, and ensure that future slips and subsidences will be reduced to the minimum and that the need for maintenance generally will be lessened.

Plans for Liege Electrification

THE next stage in the electrification programme of the Belgian National Railways will be conversion from Brussels Nord to Liége. Four substations will provide the 3,000 V. supply for this 62-mile line, and will be situated at Brussels Nord, Louvain, Landen, and Bierset-Awans, the average spacing being approximately 19 miles. Except at Brussels, where the incoming feeders are at 36 kV. and the H.T. switchgear is indoors, the substations will be connected to 70 kV. lines through outdoor switchgear. The

transformer and rectifier equipment will be installed in 3,000 kW. groups, with three groups initially at Brussels, Louvain, and Bierset-Awans, and two at Landen. There will be space for a fourth group at Brussels and Louvain, as these two substations will supply other loads in later stages of the programme. Brussels Nord will furnish power for the main line to Namur and the slow lines to Ghent, as well as sharing the loads of the existing Brussels-Antwerp and Nord-Midi Junction electrifications. Louvain will provide for the lines to Malines and Ottignies. The line from Voroux to Kinkempois will be electrified for goods traffic, and supplied from Bierset-Awans. The Brussels Nord substation is already built and work has begun at Louvain. All these works form part of the second stage of the electrification programme, intended to be completed by the end of next year and to include the Brussels-Ostend line and branches.

Measuring Locomotive Feedwater

DURING efficiency tests of steam locomotives the amount of water used is one of the most important items to be determined. In Bulletin No. 65 of the University of Illinois Engineering Experiment Station, details are given of an electric recording meter which has recently been devised for steam locomotive testing with the University of Illinois and Illinois Central Railroad dynamometer car. The meter operates on the principle of a stream flow meter and can easily be placed in the hose connection between the locomotive and tender. The rotor is placed directly in the water stream and turns in proportion to the velocity of water. A rotor reducing gear is fitted together with a contact-making device, and an electric circuit is energised by the closing of a micro-switch by four small rollers attached to a wheel whose shaft is driven by the large gearwheel of the reduction gear. By means of a calibration chart the duration of contact is related to the flow of water. The design of the meter is such that construction can be undertaken in the average machine shop, and details for this purpose are given in the Bulletin.

East African Port Control

THE East African Central Legislative Assembly has now before it the report of a committee appointed last July to inquire into the working of Mombasa port. The inquiry arose mainly from agitation in shipping circles over congestion at the port, which became serious at the beginning of 1951, and led to limitation of the tonnage of imports to the capacity of the port. Of the 33 recommendations in the report the fundamental one advocates setting up an autonomous port organisation at Mombasa, separate from the railways and under its own general manager.

The difficulties at Mombasa cannot fairly be ascribed to lack of foresight by the East African Railways & Harbours. Although after the war the traffic of the port began to increase rapidly, the trouble in 1951 was caused by an accumulation of East African cargoes in United Kingdom ports, awaiting shipping which had been temporarily diverted to other duties, and the subsequent congestion when they began to arrive all at once at their destination during an exceptionally heavy rainy season. The administration has been long convinced of the need for additional facilities at Mombasa, but its difficulty is to finance them and, after that, obtain materials. The Kenya & Uganda Railways financed out of reserves the construction of two additional deep-water berths which were brought into use in 1946. In 1948 when that railway combined with the Tanganyika Railways to form the present system one of the chief tasks facing the new organisation was to improve as soon as possible the port of Dar-es-Salaam and build a new port at Mtwara, both in Tanganyika; these works were given priority at the behest of the British Government as necessary to ensure the success of the groundnut scheme in that territory to which Britain was committed. The sum of £1,200,000 had been allocated for general harbour improvements in East Africa, but rising prices increased the cost of the works at Dar-es-Salaam so much that only £103,000 was left for the port of Mombasa. The administration found it impossible to obtain sanction to increase the overall £23,000,000 loan for capital works, which included large sums for new lines to serve groundnut areas in Tanganyika. Although subsequently the situation has been changed by world events and the great expansion of trade in East Africa, and a £60,000,000 capital authorisation has been made, only £17,500,000 has yet been raised.

One of the weakest points in the report is the lack of reference to means of obtaining capital for building the fourth deep-water berth and providing more lighters at Mombasa which the committee strongly advocates. The only way in which such works could be financed is by re-allocating the funds set out in the loan schedule. The committee, moreover, fails to differentiate between money spent and commitments entered into, which may take time to materialise. A judicious balance also must be preserved between planning and the likelihood of raising capital.

The East African ports are essentially rail ports. Mombasa, for instance, is separated from its productive hinterland by some 300 miles of desert and very little of its import traffic is other than railborne. In South Africa, where unified control has existed for many years, it is recognised as vital to the balance of the national economy. In East Africa it is particularly necessary to up-country users that the ports should be free from sectional interests. One of the greatest arguments for overall management is the unified control which it gives of locomotives and rolling stock within the port area. When before the war there was a Port Manager at Mombasa, abundant wagons were at times being used uneconomically in the port while the rest of the country was short of stock. The outbreak of war and the urgency of improving turnround made a change imperative, and wagon control was placed under the Transportation Department, with immediate improvement. The present shortage of wagons caused by the slow delivery of orders makes this control still essential. It is difficult to see how the setting up of a port authority with its own General Manager and a new and costly establishment could make for greater economy or efficiency.

In view of its complaints about the inadequacy of the port, the committee's contention that railway offtake has not kept pace with port capacity and has consequently contributed to congestion there, seems inconsistent. At times of heavy or abnormal up-country demand, it has naturally lagged somewhat behind port clearance but at other times the capacity of the Mombasa—Nairobi section has not been used to the full because of insufficient traffic from the port. The average monthly tonnage lifted by rail in 1952 was 94,823 deadweight tons. The track capacity of the line allows for 116,000 tons but services are limited by the number of locomotives and wagons in stock, which is dependent on the firm delivery of the large orders placed in the United Kingdom.

February Operating Results

RECENT issues of *Transport Statistics* point to a tendency for British Railways to become more dependent on mineral and coal class traffics as time passes. It is true that in the four weeks to February 22 minerals decreased by 16,000 tons (0·3 per cent) from 1952, but carryings were 51,000 tons above 1951 (one per cent) and are thought to have been heavy in March. The February tonnage of coal and coke was 14·3 million, an increase of 517,000 tons (3·7 per cent) and a record for any four-week period since nationalisation. During the first eight weeks of 1953 British Railways carried 235,000 more tons of minerals and 1,011,000 more tons of coal and coke. These increases largely reflect the improved productivity of the iron and steel industries, as coal shipments at docks and wharves controlled by the Docks Executive were only 105,000 tons higher than a year ago.

The rise in heavy traffics would be gratifying, if it were not offset by reduced forwardings of merchandise. In

February, the reduction was 365,000 tons (8·6 per cent) and the loss evidently continued in the March period because merchandise receipts were then 1·7 per cent below 1952. Coming after a decrease of 3,000,000 tons last year (5·7 per cent), the persistent decline in high-rated goods is disquieting. It occurs in all Regions, though the Eastern was hit hardest in February, losing 121,000 tons of merchandise or 18·1 per cent of the 1952 quantity. The Eastern Region loaded 22,000 fewer wagons of merchandise (13·4 per cent), but to its credit had a wagon load at starting point of 4·19 tons, well above the all-line average of 4·04 tons.

Railway Operating Statistics

A noticeable feature of the February statistics was an increase in the length of haul for all traffic to 75 miles, the longest distance since March, 1952. The haul of merchandise was six miles longer than a year ago, and set up a record of 131 miles; but the smaller tonnage produced 19,000,000 fewer ton-miles. The lengthening of the coal haul by two miles to an average of 58 raised ton-miles by 50·7 million, or 6·1 per cent. With minerals passing over almost the same distance of nearly 80 miles, the total ton-mileage was lifted by 34·7 million, or 1·9 per cent, to 1,841·8 million—a record for this period.

In working the extra ton-miles, 105,000 more train-miles were run (0·9 per cent), causing a small increase of 4,000 in train engine-hours. Apparently a larger proportion than usual of the traffic passed direct to destination, as shunting engine-hours were cut by 41,000 (3 per cent), all Regions sharing in the reduction. The net ton-miles per train engine-hour increased by 23 to 1,116, despite a set-back of 25 to 1,073 in the Western Region. A return of 1,080 from the London Midland Region was 41 points above last year's figure, but far below the Eastern return of 1,241 and the North Eastern output of 1,402 ton-miles.

Wagon-mile results were peculiar. Loaded wagon-miles were down by 132,000 (0·1 per cent), while empty wagon miles were up by 3,186,000 (3·1 per cent). Altogether 362·3 million wagon miles were worked, 0·9 per cent more than last year. The number per train engine-hour was 220, the Regional statistics varying from 260 in the North Eastern and 242 in the Eastern to the poor Western Region record of 204. In January and February the Scottish Region went ahead of the London Midland and of the Western Regions.

Last year's average train load was about two tons below the 1951 average of 162 tons. This year the load is rising with the higher traffic volume. In February the London Midland Region had a load of 186 tons and the Eastern recorded 175. The all-line average load was 163 tons and moved at an average speed of 8·3 miles an hour. The North Eastern Region, with a light load of 156 tons, registered a speed of 10·2 m.p.h. and the Scottish Region moved a load of 117 tons at 10·1 m.p.h. Mobility improved in the London Midland and in the Eastern Regions, but was not so good in the Western.

Electrified Freight Lines

Traffic on the Manchester—Sheffield—Wath electrified lines was heavier than in any period since March, 1952. The number of loaded wagon-miles worked was 693,883, an increase of 29,026 on January (4·3 per cent). The increased traffic involved the running of 24,989 freight train-miles, 906 more than in January (3·7 per cent). Movement was slower, a train speed of 7·2 m.p.h. comparing with the January speed of 7·5. The number of wagon-miles worked in a train engine-hour was 122, one less than in the previous period. As electric operation began on February 4, 1952, it will be possible to make a satisfactory comparison between the March period and the corresponding four weeks of 1952.

Railway Passenger Traffic

The number of passenger journeys originating on British Railways in the month of January was 86,816,000, a decrease of 2,583,000, or 2·9 per cent, from 1952. An increase of 3,469,000 (27·5 per cent) in passengers paying full fares was wiped out by large decreases in all other bookings.

The largest losses shown were in the Southern Region, which carried 1,196,000 fewer people (3·1 per cent), and in the London Midland, which carried 916,000 fewer (5 per cent). The number of first class passengers was 1,819,000, representing a decrease of 317,000 (14·8 per cent). All Regions had substantial losses of higher class travel, ranging from 15,000 in the Western (7·6 per cent) to 97,000 in the London Midland Region (13·1 per cent).

London Transport railways originated 43·7 million journeys in the February four-week period. That was a small number for a winter period, being 3,898,000 below 1952 (8·2 per cent). Railway car-miles were cut by 856,000 (5 per cent).

Road Transport

British Road Services carried 3,012,000 tons in February, 435,000 tons less than last year (12·6 per cent). Vehicle miles were reduced by 4,839,000, or 8·3 per cent, to 52,872,000.

Road passenger transport issued tickets to 169,372,000 passengers, a decrease of 215,000 (0·1 per cent). The Tilling Group carried 739,000 fewer people, while the Scottish Group carried 524,000 more. Both groups ran additional car-miles, totalling 362,000 (0·9 per cent).

London Transport carried 266,138,000 passengers by road, 21,330,000 fewer than a year ago. This decrease of over 7 per cent was probably caused in part by bad weather. Road car-miles were cut by 502,000 (1·5 per cent).

Inland Waterways and Docks

Inland waterways originated 999,000 tons of traffic in February, a decrease of 33,000 tons (3·2 per cent). The North Eastern Division accounted for nearly half of the traffic and for more than half of the ton-miles worked over the canals. The carriage of coal and liquids in bulk increased, but the tonnage of merchandise diminished by fully 13 per cent in February, as in January.

Trade at the Commission's docks, harbours and wharves was rather slack in February. Inward traffic of 1,947,000 tons was 32,000 tons below 1952 (1·6 per cent), and outward traffic of 3,277,000 tons was lower by 74,000 tons (2·2 per cent). The net register tonnage of shipping arriving and departing was less than in 1952 in much the same proportions.

Tests of a 500 h.p. Diesel-Mechanical Locomotive

IN July, 1951, the Hunslet Engine Co. Ltd. completed the first of two eight-wheel, 500 b.h.p. diesel-mechanical locomotives built to the order of the Peruvian Corporation for service on the Paita-Piura Railway; the locomotives were described and illustrated in the November, 1951, issue of our associated publication, *Diesel Railway Traction*. Through the courtesy of Mr. R. A. Riddles, Member of the Railway Executive, British Railways, and the collaboration of the motive power and traffic departments, Leeds area of the North Eastern Region, British Railways, the first of the locomotives underwent extensive freight trials in Yorkshire from July to October, 1951, before being shipped overseas. The result of the trials formed the subject matter of a paper entitled "Running Tests of a 500 b.h.p. Diesel-Mechanical Locomotive" delivered before the Institution of Locomotive Engineers by Mr. Brian Reed on Wednesday, April 15.

The author said that in order to simulate as far as possible the more critical conditions in Peru the Guiseley and Yeadon branches of the line were chosen. Heavy mineral trains were handled for some five weeks from Stourton over the old Midland main line to Apperley Junction, and then up the branch line to Guiseley and Yeadon. The trials were carried out on normal freight services taking

the loads offered, but as a final stage, dynamometer car trials were undertaken for two weeks on the Guiseley branch run. Train weights were changed daily so that a heavy load was hauled over the main line, and loads, varied to suit different gear steps, were pulled up 1 in 60 grades.

For the first week of the dynamometer car trials the transmission included both a Vulcan-Sinclair scoop controlled fluid coupling and a Hunslet friction main clutch. For the second week, the fluid coupling was taken out, so that a comparison could be made of the two systems. Finally at the end of the first week of the dynamometer car trials, to reproduce, as far as possible, a through run from Paita to Piura and back, a single return trip was arranged between Stourton and Lancaster; approximately 66 miles in each direction. During the lie-by time at Lancaster maximum-pull tests were undertaken; starting pull-tests were undertaken also on two occasions at Stourton.

Regarding shunting tests at Stourton, Mr. Reed said that for a 500 b.h.p. locomotive the work was not hard. Because of the Bank Holiday period, the number of wagons brought into the yard for a few days was not large. No record was taken, but normally up to 36 loaded coal wagons weighing 625 tons was the maximum train weight. Mr. Reed said that the diesel cleared the trains and the yard more quickly than the "3F" steam engines, normally employed on this service, and during the 24 days the diesel was at Stourton, the railway considered it to be on duty 132 hr. Of that period the oil engine was running 90 to 92 hr.; the practice was to shut the engine down when it was known that an interval of five minutes or more was to occur.

The fuel consumed over the period was 275 gal. including the fuel consumed running light between the maker's works and Stourton, 3¼ miles daily,—equal to 2·08 gal. per hr. probably 1·95 gal per hr. in the yard which indicates the locomotive was in no way extended; the locomotive covered 178 miles in the yard. First, second and third gears were used, but it was seldom that more than one gear-change was made in the course of any particular movement. In running light to and from the maker's works all six gears were used, and up to the top speed of 33 m.p.h. the riding was steady. During the 24 days the diesel locomotive was on duty at Stourton, and of the 132 hours booked as on duty, the locomotive was actually working or available 129¼ hr., equivalent to 98 per cent. Tests were also undertaken with the locomotive on open-line freight working, with which Mr. Reed also dealt, together with dynamometer car tests, the first to be conducted with a diesel-mechanical locomotive in freight service in this country. Measurements with the dynamometer car showed that very high drawbar pulls of great steadiness could be maintained, and that up to three or four m.p.h. factors of adhesion of 3·0/3·2 to 1 could be maintained with dry unsanded rails. Even under unfavourable conditions, *i.e.*, loose-coupled stock, gear changes could be made with peak or surge pulls no greater than those of steam traction. The fall in tractive effort during gear changes were of no practical importance, and the trials as a whole proved the reliability of diesel-mechanical locomotives for consistancy and steadiness of performance under all rail conditions.

Queensland Railways

THE report for the year ended June 30, 1952, of the Commissioner for Railways, Queensland, is signed by Mr. G. V. Moriarty, who assumed office on September 1, 1952, on the retirement of Mr. T. E. Maloney. The financial year, the report shows, closed with a deficit of £3·4 million, £1·9 million more than for the preceding year. Although gross earnings of £22·5 were a record, one was achieved also with working expenses, which at £24 million were £5 million higher than for 1950-51. The increase in expenditure is said to be the result mainly of variations in the awards of the Industrial Court, basic wage and automatic increases which accounted for £3·4 million, and the cost of stores and coal issues and contingencies rose by £1 million. The weekly basic adult male wage for Queensland rose during the year from £8 6s. to £10 7s., and to £10 13s. in July, 1952.

The following are some of the principal results:—

	1950-51	1951-52
	(Thousands)	
(*a*) 3 *ft. 6 in. gauge lines*—		
Passenger-journeys	33,961	34,840
Passenger train-miles	6,382	6,542
Goods tonnage carried	6,863	6,457
Goods train-miles	11,962	11,879
	(£ thousands)	
Passenger, parcels, &c., receipts ...	3,821	3,893
Goods traffic receipts	14,752	17,887
Total earnings	19,192	22,523
Working expenses	18,975	24,057
(*b*) 4 *ft. 8½ in. gauge lines*—	(Thousands)	
Passenger journeys	184	189
Goods tonnage carried	317	364
	(£ thousands)	
Total earnings	580	834
Working expenses	464	603

A decline in passenger earnings occurred in passenger travel, though it was partly offset by a rise in suburban traffic revenue; the number of suburban passenger journeys being exceeded only during the war of 1939-45. Unfavourable weather during the year under review resulted in a drop in the tonnage of agricultural produce, mainly sugar cane; because of the drought fewer cattle were available for export. The tonnages of coal, other minerals, and timber increased. Mr. Moriarty considers that the record tonnage of the previous year would have been surpassed had normal seasonable conditions prevailed in 1951-52. Two increases in principal freight rates took effect during the year, of 10 per cent on January 1 and of 5 per cent on June 1, 1952. Even these increases are not thought likely to offset rising expenditure, and the current year is expected to end with a substantial deficit.

The problem of transporting locomotive coal long distances is a serious one. In 1951-52 the Queensland Railways hauled 885,000 tons of locomotive coal an average distance of 190 miles a ton (against 70 miles a ton for coal for public consumers), representing 11 per cent of the total net ton-mileage. The average haul of locomotive coal for the Great Northern line was 506 miles.

During the year 51 new locomotives were placed in service, comprising ten "C17" class built by Walkers Limited, Maryborough, eight Beyer-Garratts delivered by Beyer Peacock & Co. Ltd., 30 "BB18¼" class supplied by the Vulcan Foundry Limited, and three "DD17" suburban tank engines built in the Ipswich Railway Workshops. An order was placed with the Australian General Electric Pty. Ltd. for 12 more diesel-electric locomotives, equipped with General Electric (U.S.A.) diesel engines, traction motors built at the Auburn, New South Wales, works of Australian General Electric Pty. Ltd., and mechanical construction and complete assembly by Walkers Limited, Maryborough. They are less powerful than the 20 diesel-electric locomotives previously ordered and are for use on the lighter main lines. Delivery was delayed of the first of the eight air-conditioned passenger train sets built by the Commonwealth Engineering (Queensland) Pty. Ltd. Mr. Moriarty expresses his regret that financial stringency necessitated exclusion of some luxury features from the air-conditioned train under construction at Ipswich, and prevented work from being started at Ipswich on twelve "Sunshine" saloon-type coaches. Some 600 wagons were placed in service, all built in Australia. The tender of the Commonwealth Engineering (Queensland) Pty. Ltd. was accepted for the supply of 1,000 VJM four-wheel steel coal hopper wagons; this contract was based on the importation of steel parts fabricated ready for assembly and for the assembly of the wagons at the Rocklea works of the contractors.

Civil engineering works completed included the Moonmera-Moongan deviation (eliminating the rack section); regrading and reconditioning of the Almaden-Mount Surprise section of the Etheridge Railway; and re-arrangement of Toowoomba yard. Work proceeded on quadrupling in the Brisbane area.

Re-survey of the Brisbane electrification project was almost completed.

LETTERS TO THE EDITOR

(The Editor is not responsible for opinions of correspondents)

The "Inter-City" Express

March 23

SIR,—On March 19 I travelled for the first time in the "Inter-City" express from Paddington. The arrival at Birmingham was eight minutes late after an apparently unchecked run, though one would not trouble to complain of that these days. But I do wish to register a protest at the sanitary arrangements of what is new, or perhaps more likely re-conditioned, rolling stock. The three first-class coaches coupled together next to the restaurant-car had only one lavatory compartment each. By the time the train had passed Bicester the water supply in one had been exhausted by the continued usage.

Now presumably British Railways meant this train to be an object of pride as they have given it a name and also a schedule which is the nearest approach so far to the brilliant pre-war timings of the G.W.R. And yet someone in a responsible position has allowed this train to go into service with lavatory accommodation appropriate to the nineteenth century. It is sincerely to be hoped that this second-rate rolling stock will have been relegated to secondary duties before it puts British Railways to shame in the eyes of the many foreign visitors who will shortly be travelling to Birmingham to visit the British Industries Fair.

Yours faithfully,

G. M. BARRETT

30, Pilgrims Way East, Otford

[All first class stock built for the G.W.R. for some years before nationalisation was provided with a lavatory compartment at one end only. The date of building the last first class stock with two lavatories was 1925 and these vehicles are not sufficiently modern to form a service such as the "Inter-City." The three first class coaches next to the dining car in that express have only one lavatory compartment each; they were constructed in 1950, are in good exterior and interior condition, and can in no way be regarded as "second rate rolling stock." Only three of the new British Railways standard first class coaches, which are two-ended lavatory stock, are at present available on the Western Region, and are formed in the "Bristolian" express.—ED., *R.G.*]

Diesel and Steam Locomotives Compared

March 28

SIR,—I am interested in the letter addressed to you by Mr. H. Charnley on the above subject, which appeared in your issue of March 20, and would like to offer some remarks with the idea of assisting your correspondent to understand how the New York Central class "S1" 4-8-4 locomotives compare with three-unit 6,000 h.p. diesel-electric locomotives so far as power output and the operation of 15-car trains is concerned. In the first place, a few of the leading dimensions of the N.Y.C. class "S1" are given as follow:—

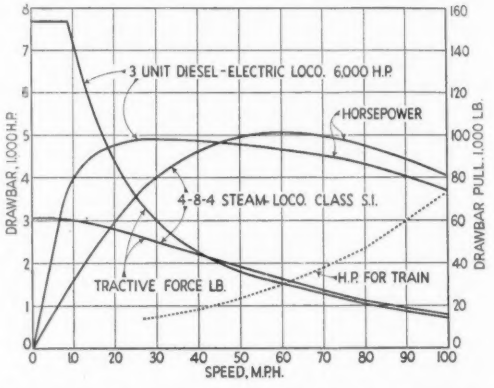
Cylinders	25½ in. × 32 in.
Driving wheels	79 in. dia.
Steam pressure	275 lb. per sq. in.
Heating surfaces—	
Evaporative	4,819 sq. ft.
Superheater	2,073 sq. ft.
Total	6,892 sq. ft.
Grate area	100·1 sq. ft.
Rated tractive force	61,500 lb.
Weight, engine	471,000 lb.
,, tender	337,400 lb.
Locomotive in working order	808,400 lb.

The result of extensive dynamometer car tests on the road, conducted to establish capacity performance, gave the following information:—

Maximum I.H.P.	6,600 at a speed of 85 m.p.h.
Maximum D.B.H.P.	5,050 at a speed of 63 m.p.h.

These results are obtained with the standard working steam pressure of 275 lb. p.s.i. The boilers are designed for a pressure of 290 lb. p.s.i. and, when so operated, the powers developed become 6,900 i.h.p. and 5,300 d.b.h.p. at the same speeds m.p.h.

The accompanying diagram shows clearly how the steam and diesel-electric locomotives compare on a power output basis. At speeds in excess of 50 m.p.h., the steam locomotive develops a greater d.b.h.p. than the diesel-electric. I have included a curve showing the horsepowers required


3 UNIT DIESEL-ELECTRIC LOCO. 6,000 H.P.
HORSEPOWER
4-8-4 STEAM LOCO. CLASS S.1.
TRACTIVE FORCE LB.
H.P. FOR TRAIN
DRAWBAR, 1,000 H.P.
DRAWBAR PULL, 1,000 LB.
SPEED, M.P.H.
0 10 20 30 40 50 60 70 80 90 100
0 1 2 3 4 5 6 7 8
0 20 40 60 80 100 120 140 160

Comparison of steam and diesel-electric locomotive power outputs

to operate a 15-car train at speeds of from 30 to 100 m.p.h. The curve shows the powers required to operate a train of 15 cars weighing 1,005 short tons on a level tangent track, including air conditioning and electric lighting, 14 20-k.W. generators, average demand 60 per cent.

For both locomotives the balancing speed is 100 m.p.h., at which the steam locomotive produces slightly more power output. Some years back extensive tests were carried out by the Association of American Railroads with the idea of establishing the power necessary to operate 1,000 ton passenger trains at 100 m.p.h., and a reference to these trials will be found in *The Railway Gazette* of August 4, 1939. Of the three locomotive types tried, one of the 4-8-4 type as used on the Union Pacific for passenger service was the only engine to reach 100 m.p.h. with the test train. This locomotive attained just over 100 m.p.h. on a slightly falling grade of 0.13 per cent.

The attainment of high speeds with heavy trains at economical rates of cut-off is one of the problems confronting steam locomotive designers and for maximum performance it will be found necessary greatly to improve the steam flow through the cylinders. The indications are that this cannot be accomplished so long as piston valves and ordinary valve gears are retained. It therefore becomes necessary to develop cam-operated poppet valve applications, by which alone adequate steam inlet port openings can be attained. If the performance of high speed piston valve locomotives is more closely examined than has now been possible, it will be found that poppet valve gears have given greatly improved cylinder powers at high speeds in combination with high power output.

Yours faithfully,

E. C. POULTNEY

66, Eton Rise, N.W.3

SCOTTISH REGION FREIGHT SERVICE WITHDRAWN.—The freight train service to Auchenmade Station and Lissens Siding was withdrawn on March 30, and the station and siding were closed on that date. Both stations are on the Scottish Region branch line between Giffen and Kilwinning East, on which line there has been no passenger train service since July 4, 1932.

THE SCRAP HEAP

Profuse Apologies

"Peterborough," in *The Daily Telegraph*, mentions the notes from the General Passenger Agent, Suburban, of an American railway, which are left on the seats of trains after a delay to explain its cause and express apologies. He writes: "It is unlikely, I gather, that similar slips will be issued here in case they cause another paper shortage."

Hilarity in the Van

The *Staff Magazine* of the East African Railways & Harbours quotes the following report from an African guard: "May I frankly notify you that O ———, travelling pointsman on No. ——— up train, this day was unbelievably abnormal due to drunkardness with effect from ——— Station. This man was dancing in the brakevan, eating waybills and laughing at himself. This made us lose three minutes in the section."

Fintona Tram Returns

The Fintona horse tram of the Great Northern Railway (Ireland), repaired and painted, was greeted by a crowd of over two hundred cheering people when it returned to service from Dundalk Works. Some weeks ago "Dick," the horse, bolted and the tram came into violent contact with some wagons. The staircase, platform and part of the bodywork were badly damaged.

It was towed by an engine from Dundalk, and its arrival was heralded by fog signals. More than 100 people assembled at the junction of the lines and they all found a foothold on the vehicle. Fintona people were delighted that the tram had not changed its form and was still a double decker.

The car was built by the Metropolitan Railway Carriage & Wagon Company in 1883. The lower saloon is divided into one first and one third class compartment, each holding 12 passengers. The upper deck, which is open, seats 24, and is third class. Until recently the tram was tricomposite, with first and second class below and third on top.

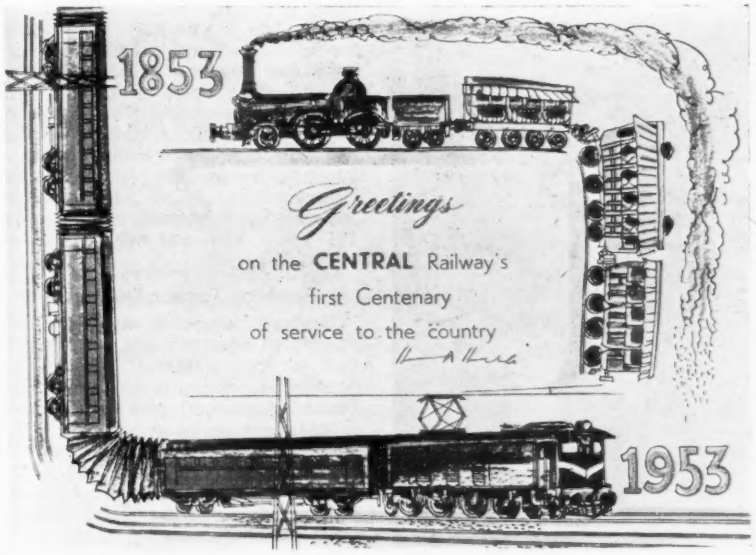
Subsequently, Mr. William J. Mc Clean, who has driven the tram for over 30 years, harnessed "Dick" to the tram and all who had turned out to welcome the vehicle were given free trips to the junction and back to the station.

Railway History on Wheels

The only mobile museum in the world has been completed by the Canadian National Railways and will be on display this summer. It consists of three locomotives and six vehicles which are themselves museum pieces, and will contain hundreds of exhibits related to railways in Canada from 1836 to the present day. The train will also be used when centenaries and similar events occur, and eventually it will be seen in all parts of the country. It will be staffed while on exhibition by retired railwaymen dressed in the style of costume worn by crews a hundred years ago.

Mogul No. 674, of 1899, the oldest locomotive still operating on the C.N.R., will haul the train. Other motive power in the train will be wood-burner No. 40, the first standard gauge engine ordered by the Grand Trunk, and a saddle tank switching locomotive of 1894. Early coaches, dining, and sleeping cars have been restored to their original appearance and included in the consist of the train. Three baggage vans of 1866, 1877, and 1879 have been converted to house permanent exhibits ranging from tickets, lanterns, rails, Bible racks, and pictures, to the power plant of the first diesel electric car in North America.

Centenary greetings from the Central Railway, India



Impressions of Indian railway trains of 1853 *and* 1953 *on a greetings card sent to us by Mr. H. P. Hira, General Manager of the Central Railway*

Loco Lines

Steel Talk

Where are they sending you, all you big engines,
Shining and sleek, in the bright morning sun?
Out, through the dawn and the dusk and the night,
On, in the wake of the westering light,
Till we come to where the land, sea and air all unite
And journeying's done.

What are you hauling, then, all you big engines,
Out by the mountain, the mill and the mine?
Exports to garner hard-currency gold,
Fuel for factory, fireside and fold,
Cargoes unspecified, oddments untold,
Too hard to define.

What do they feed you on, all you big engines,
To keep you so strong and so shining and sleek?
Clean, honest coal, without too much dust,
A good head of seam, to give us our thrust,
And plenty of oil, to keep out the rust,
And rest once a week.

How do they care for you, all you big engines,
When you are feeling the strain and the stress?
That's where a loco gives mankind a start,
They replace her tubes and renew her stout heart,
But mortals go on till their joints fall apart
And there's no redress.

What of your passengers, all you big engines,
Who take us so swiftly from place unto place?
There's light-hearted youth, striding out on the road,
And sore-shouldered age, stumbling under its load,
All of them bearing the imprint of God
And none without grace.

What do you think about, all you big engines,
When twilight falls and your long day is past?
We live once again in the deeds we have done.
The long hauls completed, the tough schedules run,
Till the scrap-heap's dark shadow engulfs everyone
And peace comes at last.

A. B.

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

EAST AFRICA

Calculating Stresses on Track

For many years the design of locomotives has been restricted by the maximum axleload permissible on the lightest rail over which they would be required to operate. Detailed investigations by the Chief Engineer and Chief Mechanical Engineer have resulted in the adoption of a precise method of calculating stresses induced in the track by a particular locomotive. These stresses are influenced not only by the actual static axleload, but also by the size of the wheels, their spacing, the balancing of reciprocating and revolving parts, the inclination of the cylinders, the sleeper spacing and the speed. Stress in the rail is not always the governing factor; sometimes sleeper loading is of greater importance.

Investigations have conclusively shown that the method of accepting the maximum axleload as the sole criterion of the ability of a particular weight of rail to carry a particular engine is based on false premises. Indeed, it is capable of resulting, and has in fact resulted, in an unnecessarily restricted and consequently uneconomical design of engine, or, in some circumstances, in one which would dangerously overstress the track.

Class "59" Axleload

The "59" class Beyer-Garratt locomotives on order are an outstanding example of the value of the new methods of stress analysis. These locomotives, weighing 240 tons each, will be the heaviest to run on metre-gauge. As originally designed, they were to have a load of 17 tons on each axle and on the basis of the old method relating the maximum axleload to the weight of rail, they could be accepted on 80 lb. track. Detailed calculations carried out under the new method disclosed that the engine as designed would induce severe stresses in the track. but by increasing the load on the driving axles to 19 and 18 tons and by respacing the carrying wheels, a design was evolved which could be operated at 40 m.p.h.—the present maximum permitted speed or at speeds even higher on 80 lb. track. Furthermore, while the revised engine was of the same total weight as the original design, the heavier loading on the driving wheels increased the weight available for adhesion, making possible an increase in tractive effort and thus providing a more efficient and powerful locomotive.

BRAZIL

Underground Railway at Rio de Janeiro

An agreement for the building of an underground railway in Rio de Janeiro has been signed between the municipality and the French Société Général de Traction et d'Exploitation (the former Paris Métro company). The system is to total 13½ miles, and is one of several projects drawn up by this French enterprise and referred to in the July 18, 1952, issue.

British-built Electric Locomotives

Fourteen Metropolitan - Vickers Bo-Bo locomotives have been supplied recently to the 3,000 V. metre-gauge electrified system of the Rêde Mineira de Viaçao. One of them is seen in the accompanying illustration. In front of it (on the right) is seen Dr. Roberto Carneiro, Manager of the Electrification Service, and with him is his Assistant, Dr. Francisco Alvin. The locomotives weigh 50 *tonnes*, and are rated at 1,070 h.p. The mechanical parts were built and the locomotives were erected by Metropolitan-Vickers—Beyer, Peacock—at the Stockton Works. Ten similar locomotives have been supplied to the Rêde Viaçao Parana—Santa Catarina.

Features of the design are Metropolitan-Vickers swing link suspension in place of swing-bolster bogies, rubber-bushed links for the traction motor nose suspensions, and Metrovick rubber-resilient gearwheels. There are six economical running speeds, and rheostatic braking for constant-speed operation on long downgrades.

Metropolitan-Vickers Bo-Bo electric locomotive in service on the Rêde Mineira de Viaçao, Brazil (see accompanying paragraph)

Paulista Improvements

The Minister of Transport has authorised the Paulista Railway to draw £2,636,660 to convert the line from Pederneiras to Bauru to broad gauge, acquire 500 wagons and 26 electric locomotives, electrify the Jau-Bauru section, modernise signalling, and carry out other improvements.

Oil Burning Locomotives

The Rio Grande do Sul Railway is adapting 31 steam locomotives to burn oil at a cost of £42,000.

Rêde Mineira Lease Rescinded

The Executive has authorised the rescission of the contract which leased the Rêde Mineira de Viaçao to the Minas Geraes Government in June, 1948. The line will revert to Federal administration.

ARGENTINA

New Junction Between Systems

A short line connecting Santa Isabel (San Martín Railway) and Rastreador Fournier (Mitre Railway) has been completed. San Martín Railway stations on the Saforcada-Santa Isabel and Rawson-Arribeños branches now have direct access to the ports of Rosario, Villa Constitución and San Nicolás, and the heavy grain traffic originating at them will no longer have to be routed *via* Junín. As an example, the distance between Santa Isabel and Villa Constitución has been reduced from 305 to 161 km. The cost of the line was 1,100,000 pesos.

Southern Transandine Railway

During the recent official visit of President Perón to Chile, it was agreed that the completion of the Southern Transandine Railway, connecting Bahía Blanca (Argentina) with Chilean ports, should be undertaken as soon as possible. Work was suspended some 40 years ago, when the track had reached Zapala on the Argentine side and Curacautín on the Chilean side. At the latter point the Las Raíces tunnel was bored. Only some 155 km. now remain to be laid. With the object of personally studying the terrain, the Minister of

Transport recently made a trip of inspection over the route between Zapala and Lonquimay on the Chilean border. The maximum gradient of the new line will be 1 in 50 and the highest point 1,750 metres above sea level, which will enable the line to be worked all the year round without interruption from the weather.

SPAIN

Leon-Palanquinos Doubling

On February 1 the doubling between Palanquinos and Leon, 18 km., on the main line to Galicia and Asturias, was completed. There is now double track throughout between Madrid and Leon, 421 km. The projected electrification from Leon to Gijon and Leon to Ponferrada is expected to increase the traffic on this short section, which was already hampered by the single track. The work has included the construction of a new bridge over the River Esla. The station at Torneros, 9 km. south of Leon, is to be rebuilt.

ITALY

Improving Genoa—Ventimiglia Line

Improvements on the Genoa-Ventimiglia line (94 route miles) have been in progress for some time. It is intended to restore the line to its pre-war condition this year. Structures damaged during the war and only temporarily rebuilt are being replaced by permanent structures.

Near Celle Ligure station, 21¼ miles west of Genoa Principe, the line is being realigned on its pre-war formation (having been deviated to connect with a temporary structure), and a second track is being laid between Loano, 47 miles west of Genoa Principe, and Albenga, five miles further west.

FRANCE

Railcar Policy

Monsieur Andre Morice, Minister of Public Works & Transport, reviewing transport policy in a talk given to the Methods of Communications Committee of the National Assembly, said that it was the intention to place in service some further 350 railcars and 400 trailers in addition to the 700 railcars already in operation.

Seat Reservation at Paris-Lyons

The increase of traffic resulting from the electrification of the Paris-Dijon-Lyons line necessitated improved facilities for seat reservation at Paris-Lyon, and a new reservation office was therefore designed and opened during 1952. The problem was somewhat different from that encountered in the Savoy and on the Riviera and referred to in our February 20 issue, two particular points to be borne in mind being the high percentage of reservations made by correspondence and the large number of trains composed of through vehicles for different destinations.

The principal features of the new Paris-Lyon reservation office are the discontinuance of the use of gummed reservation slips, the partitioning of the office into six cubicles and the allocation of two cubicles to each of three groups into which trains are divided according to destination, one cubicle in each case handling first and second class reservations and the other being allocated to third class. The appropriate train diagrams are kept in racks, and the maximum number of train diagrams in a cubicle at any one time is eight, covering a fortnight ahead. Normally there is one clerk responsible for each cubicle, but two clerks may work together at peak periods.

An internal communication system enables contact to be maintained with the station and town office personnel dealing with the public. Loudspeakers are situated in the cubicles, and by the operation of a switch can be used to transmit messages as well as to receive them. Seat tickets are not made out in the reservation office but by the employees in contact with the public. Previously a counter clerk could make 140 reservations an hour; the new facilities enable the clerk in each cubicle to deal with 400 applications an hour. Although reservations can be made by personal application and by telephone, every effort is made to induce the public to make them by correspondence. During the period from June 8 to August 24, 1952, 45 per cent of total reservations were made by correspondence.

Social and Welfare Fares

The Government's budget for 1952 contemplated a payment to the S.N.C.F. of fr. 16,000 million (£16,000,000) as compensation for passenger fares, such as those for individual travel by members of the forces and for large families, which are compulsorily reduced for social or welfare reasons. A supplementary credit for fr. 6,000 million has been approved, bringing the total payment by the State in 1952 under this head to fr. 22,000 million.

AUSTRIA

Electrification Loan

For construction of hydro-electric power stations required for the general economy of the country as well as for the Federal Railways, a loan is to be floated shortly; the amount is not fixed. It is hoped that subscriptions will total some Sch. 250 million, though the funds required for the completion of all schemes in hand or to be taken in hand run to Sch. 925 million for 1953 alone.

The Oesterreichische Elektrizitätswirtschafts Aktiengesellschaft, the concern responsible for financing of large public power stations, hopes to raise some Sch. 300-400 million from its own resources, with recourse to the money market for the balance. In a recent Government report emphasis has been laid on the impossibility for the Government providing any substantial funds for electrification after the approaching cessation of aid from U.S.A. The Government has promised large-scale tax relief to subscribers.

Part of the loan is to be earmarked for completion of the electrification of the Federal Railways. A further scheme envisages the erection of a transformer station in the western suburbs of Vienna to connect the public grid with the electrified railways.

IRELAND

Extension of Diesel Services

Since April 13, diesel sets have replaced steam trains on some services from Dublin to Rosslare Harbour, Galway, Westport, and Sligo, and between Sligo and Limerick. Twenty-two cars of an order for 60 units being built by A.E.C. Limited had been delivered by the beginning of this month. A protracted strike of C.I.E. electricians had long held up shipments.

The services now worked by diesel trains are: 7.20 a.m. Sligo-Westland Row; 3.55 p.m. Westland Row-Sligo; 9 a.m. Westland Row-Sligo; 2.10 p.m. Sligo-Westland Row; 6.5 a.m. Galway-Westland Row; 3.35 p.m. Westland Row-Galway; 9.20 a.m. Westport-Westland Row; 2.30 p.m. Westland Row-Westport; 8.30 a.m. Rosslare Harbour-Westland Row; 7.20 a.m. Westland Row-Rosslare Harbour; 2.50 p.m. Rosslare Harbour-Westland Row; 6.40 p.m. Westland Row-Rosslare Harbour; 8 a.m. Sligo-Limerick; and 3.35 p.m. Limerick-Sligo.

Existing steam train schedules are not being altered immediately, to allow the staff first to become familiar with new operating methods, but it is hoped that accelerations will be made in the summer. Before the next winter timetable is prepared sufficient units should be available to cover all the main improvements planned.

C.I.E. Claim Award

The Labour Court in Dublin has made the following recommendations in the dispute between C.I.E. and the seven trade unions catering for iron machinists, woodcutting machinists, vicemen and pumicers employed by the company: iron machinists, an increase of 10s. a week; woodcutting machinists (rail section), increase of 3½d. an hour; vicemen, increase of 3½d. an hour for Grade I and 10s. a week for Grade III, and for Grade II, the average of the foregoing increases; pumicers, increase of 10s. a week.

Subsidence on Sligo-Limerick Line

Traffic between Sligo and Limerick was considerably dislocated on April 9 when about 70 yards of the permanent way between Kiltimagh and Claremorris subsided. The 8 a.m. train from Sligo could not get through and passengers were taken by road to Limerick.

Difficulty is being experienced in repairing the damage, as a firm foundation cannot be secured. Already 1,000 tons of stone and gravel have been poured into the opening, but it is being swallowed up in the marshy ground.

Two S.N.C.F. 50-cycle Prototypes

French-built and Swiss-built locomotives at work on Aix-les-Bains to La Roche-sur-Foron line

TWO locomotives with 50-cycle traction motors were among the prototypes ordered by the French National Railways for service on the line from Aix-les-Bains to La Roche-sur-Foron when the decision was taken to electrify it at the industrial frequency. The first of these to enter traffic—the Swiss-built Co-Co, No. 6051—has been the subject of several articles, but less has been published hitherto about No. 6052, the Alsthom locomotive designed for a similar system of traction. A detailed description of No. 6052 by Monsieur M. Blondet, of the Société Alsthom, has now appeared in the March issue of the *Revue Générale des Chemins de fer*, so that a comparison can be made between the methods of approach to the specification requirements represented by these two locomotives. No. 6051 was described in our issue of December 29, 1950.

Dimensions, weights, and ratings of Nos. 6051 and 6052 are tabulated below. In both locomotives there is provision for running on 1,500 V. d.c. at reduced power, a stipulation made at a time when the 50-cycle system was seen as an economic method of electrifying secondary lines linking main d.c. routes. In some five years this conception has been broadened to envisage large, self-contained areas operated on industrial frequency a.c., where inter-running will not be necessary and the power/weight ratios of the locomotives may benefit accordingly:—

	No. 6051	No. 6052
Length overall ...	56 ft. 7 in.	61 ft. 6 in.
Wheel diameter ...	4 ft. 7 in.	4 ft. 1 in.
Weight	104 *tonnes*	118 *tonnes*
1-hr. rating ...	4,134 h.p. at 40 m.p.h.	4,010 h.p. at 38 m.p.h.
Continuous rating	3,978 h.p. at 42 m.p.h.	3,623 h.p. at 43 m.p.h.
Maximum speed ...	62 m.p.h.	62 m.p.h.

In designing the electrical equipment of No. 6051, Oerlikon made a special point of producing a traction motor for 50 cycles in which the normal characteristics of a 16⅔-cycle machine would be retained as far as possible. It was therefore decided to avoid the use of twin armatures connected in series, and to rely mainly on multi-path windings, and on armature and commutator construction embodying lavish cooling ducts, to deal with heavy currents. The commutator is of such a diameter that its peripheral speed is only about two-thirds that of some 50-cycle machines.

The Alsthom motor used in No. 6052, on the other hand, has two armatures and commutators, with 12 poles per armature, partly because the wheel diameter of 4 ft. 1 in. would have made it difficult to accommodate a motor with the desired number of poles in one stator. Both armatures in a motor are series-connected. The effect of these characteristics on the motor current of the two designs is shown in the following comparative table:—

	No. 6051	No. 6052
Line voltage ...	20 kV	20 kV
Voltage per motor	250 V	436 V
Transformer continuous rating (traction) ...	2,450 kVA	2,550 kVA
1-hr. rating ...	703 h.p. at 40·6 m.p.h.	668 h.p. at 38 m.p.h.
Current at 1-hr. rating	2,780 A.	1,600 A.
Continuous rating	676 h.p. at 42·5 m.p.h.	604 h.p. at 43·4 m.p.h.
Current at 1-hr. rating	2,640 A.	1,400 A.

In both locomotives the main power circuit consists of three parallel groups of two motors in series (*i.e.*, four armatures in series in No. 6052). A fixed value of resistive shunt is connected across the commutating poles, and in No. 6052 this is chosen so as to compensate the transformer e.m.f. completely at 28 m.p.h. A motor-blower is provided for cooling the shunt resistors of both locomotives, these resistances being inside the body in No. 6051, but underframe-mounted in No. 6052. In both locomotives the motors are fully springborne and drive through quill shafts. The French design uses the Alsthom type of flexible transmission, while the Swiss locomotive, the mechanical parts of which were built by S.L.M., has that company's floating ring coupling.

Control Systems

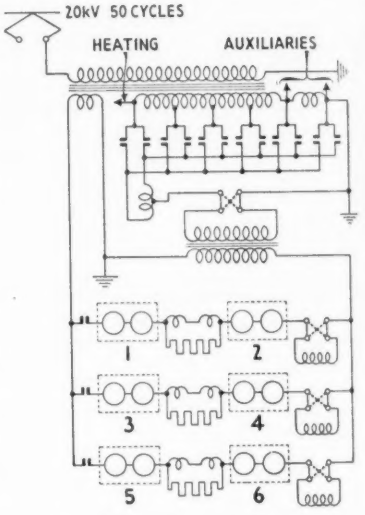
Sixteen contactors connected to tappings on the transformer secondary provide sixteen running speeds in locomotive No. 6051. The control system of No. 6052 employs 12 contactors and a commutator to give 21 running speeds by means of the circuit arrangement shown in simplified form in the accompanying diagram. The main transformer secondary has two windings, one tapped and the other fixed. By means of the commutator the voltage taken from the tapped winding can be made to assist or oppose the constant voltage from the fixed secondary, and the range applicable to the motor circuits is from 260 to 944 volts.

Different methods are used in the two locomotives for running on 1,500 V. d.c. In No. 6051 a motor-alternator supplies a.c. to the secondary of the main transformer, so that the motors are controlled through the same tappings and contactors as when running on the 20 kV. supply. The Alsthom locomotive, on the other hand, uses a rotary transformer to supply the traction motors with low-voltage d.c., and speed is controlled by varying the generator excitation.

Certainty of protection against feeding high-voltage a.c. to the d.c. circuits and *vice versa* was an important design requirement, and the same system has been adopted in both locomotives. This is an Alsthom arrangement embodying an a.c. relay fed from a 20 kV./100 V. transformer, and a d.c. relay across part of a resistance in series with the transformer primary. On the 20 kV. supply the armature of the a.c. relay is attracted, but only a very small a.c. current flows through the windings of the d.c. relay and has no effect on its armature. Application of d.c. to the system, on the other hand, leaves the a.c. relay unaffected but operates the d.c. relay. When either 1,500 V. d.c. or 20 kV. a.c. operation has been selected by the driver, the main circuit-breaker cannot be closed unless the corresponding relay has lifted.

Auxiliaries

Both these locomotives use a 380 V. 3-phase supply from an Arno type converter for the principal auxiliaries. In No. 6051 these include the compressor, and when the locomotive is running on d.c. all machines are supplied from the motor-alternator, which, as described above, also provides single-phase current for the traction motors. The three-phase machines in the Alsthom locomotive are stopped during operation on 1,500 V. d.c., as the power requirements in these circumstances are such that forced ventilation of the traction motors is not required. The compressor, driven by a d.c. motor, is then supplied from an auxiliary machine on the shaft of the main rotary transformer. In normal operation the compressor supply comes from a d.c. generator overhung on the Arno converter, which also serves for



Simplified diagram of power circuits of the Alsthom Co-Co locomotive No. 6052

battery charging. An auxiliary compressor can be operated from the battery for starting purposes.

Some details of running experience with No. 6051 were given in our May 16, 1952, issue. No. 6052 had run 108,740 miles up to February 15 last and useful data had been collected regarding the wear of commutators and brushes. Since being placed in service the average wear per brush has been 0.26 mm. per 1,000 km. Comparisons have been made between two-part and three-part split brushes, as a result of which three-part brushes have now been fitted throughout.

Resilient gearwheels are fitted in one bogie, but it has been found in practice that this additional elasticity in the drive has no influence on the condition of brushes and commutators. Measurements taken on all commutators have shown a maximum eccentricity after 101,284 miles of ·08 mm.

Special tests with starting heavy trains on gradients have been carried out, the conditions being: 900 *tonnes* on 1 in 67 (curvature 656 yd. radius), and 733 *tonnes* on 1 in 50 (reverse curvature, 437 yd. and 383 yd. radius). As a result of the performance in these conditions, it was decided to increase the loads permitted in service from 630 to 800 *tonnes* on 1 in 67 (Aix-Annecy section), and from 530 to 650 *tonnes* on 1 in 50 (Annecy-La Roche section).

Mobile Rectifier for Testing Locomotives

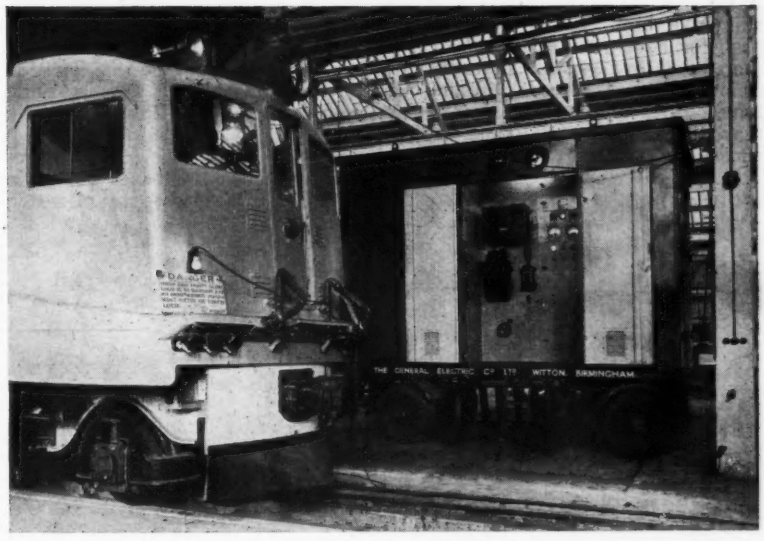
Power supply for 3,000V. tests at builder's works

THE mobile rectifier substation incorporating the pumpless steel-tank mercury arc rectifier was first introduced by the General Electric Co. Ltd. in 1938 to provide a local power supply for maintenance work on the London Underground system. Since that time mobile rectifier equipments have been produced for a wide variety of industrial applications requiring a temporary d.c. supply.

The most recent of these is the provision of an 0-4,000 V. d.c. supply for test purposes at the Glasgow works of the North British Locomotive Co. Ltd., where the forty "4E" class locomotives, rated at 3,030 h.p. at 3,000 volts, have been under construction for the South African Railways.

The whole of the electrical equipment for these locomotives is being supplied by the General Electric Co. Ltd., and while the motors and control gear are fully tested before despatch to the engine builder, it is, of course, necessary to carry out further tests after the electrical equipment has been built into the locomotive. As no permanent d.c. supply of suitable voltage was available at the North British works, a mobile rectifier substation was built by the G.E.C. to provide a temporary supply while the locomotives are under construction in Glasgow.

The substation is mounted on a road trailer, and the rectifier, transformer and a.c. and d.c. switchgear are housed in a weathertight cubicle of sheet steel construction. The equipment operates from a 3·3 kV., 3-phase, supply and is rated at 150 kW. The output voltage is adjustable over the range of 0-4,000 volts by grid control in conjunction with tappings on the primary of the rectifier transformer, and the rectifier is fitted with arc-suppression equipment which can be operated by means of an emergency trip button.



The rectifier in the North British works alongside a "4E" class electric locomotive for South Africa

WESTINGHOUSE EXHIBITS AT B.I.F.—The rectifier section of the Westinghouse Brake & Signal Co. Ltd. at the B.I.F. will exhibit several items possessing important potential uses. A prominent feature will be a demonstration of a new method of machining metals by electric spark discharge, with which it is possible to execute all standard machining operations on the hardest and toughest known metals. Intricately shaped holes can be cut to whatever outline is desired. The supply of this equipment is three-phase, whilst the d.c. is obtained from a Westalite rectifier and panel embodying numerous interesting circuit features. Another working exhibit will be a new constant potential rectifier equipment known as a Transbooster, capable of holding d.c. output voltage values to within limits of plus or minus one per cent in varying load conditions, mains variations of plus 6 or minus 10 per cent and supply frequency variations of up to minus 4 per cent. Particular uses are in automatic telephone exchanges, battery floating duties, or wherever accurate instrument testing and similar work is essential. A motor-driven Westinghouse E.13.C. compressor will be supplying air to demonstrate the various Westinghouse methods for the control of industrial compressed air. The company's signalling installations on British Railways and overseas are, of course, well known, and a demonstration of automatic signalling using coded track circuits will be the main exhibit. A selection of a.c. and d.c. plug-in relays, point valves, and terminal blocks will also be shown.

TRACTION BATTERY DEVELOPMENT.—An exhibit of interest to all users of electric industrial trucks, locomotives, and road vehicles will be shown by the Tudor Accumulator Co. Ltd. at the British Industries Fair. It will consist of a group of Tudor traction batteries fitted with Porvic separators, a tough new microporous plastic material which is practically indestructible in service. This development, by eliminating the principal cause of premature battery failure, has further increased the already long working life of Tudor traction cells. A representative selection will be shown, together with a crate of Tudor cells for general marine duties. The exhibit will be representative of the latest developments in battery construction for traction and industry.

Equipment for Belgian Congo Electrification—2*

Automatic acceleration and rheostatic braking in 50-cycle locomotives for Jadotville-Tenke route

TWELVE Bo-Bo locomotives with 50-cycle traction motors have been provided for working the Jadotville-Tenke electrified section. The electrical equipment was designed and built by A.C.E.C. (Ateliers de Constructions Electriques de Charleroi), and the mechanical parts by the Ateliers Metallurgiques de Nivelles.

Nominally the supply is 22,000 V., single-phase, but in practice it may range from 17,000 to 25,000 V. Consideration was given to a Co-Co design, with which loads of 850 or 900 *tonnes* could have been hauled, but trains of this weight are infrequent and it would still have been necessary to double-head for 1,200-*tonne* trains, which is a more usual load when the normal goods train tonnage of between 550 and 600 *tonnes* is exceeded. Passenger trains range between 400 and 450 *tonnes*. The choice therefore fell on a Bo-Bo capable of hauling 550 to 600 *tonnes* up 1 in 80 at about 28 m.p.h., or double-heading with 1,100 to 1,200 *tonnes* on this gradient at the same speed.

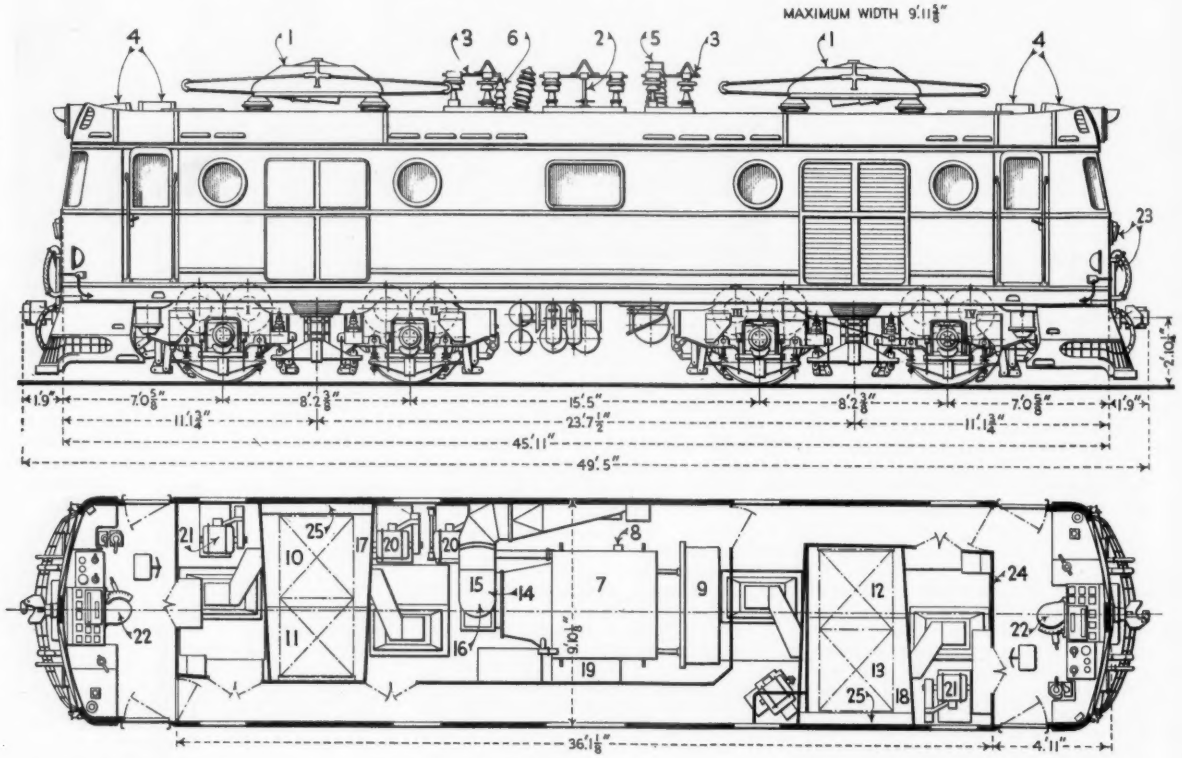
Limiting factors in the design were the gauge of 3 ft. 6 in., which restricted the horsepower per axle to between 400 and 450; an axleload of 18·5 *tonnes;* and a maximum gradient of 1 in 80. This gradient, in fact, which extends over an 18¾-mile section where speed is limited to 28 m.p.h., was the governing consideration in arriving at the 1-hr. rating of the locomotives. Speed at the 1-hr. rating had to be between 28 and 31·25 m.p.h., or about 70 per cent of the maximum permissible speed on the line of 43·75 m.p.h., and the 1-hr. horsepower had to permit the working of the heaviest trains on the maximum gradient at a speed in the foregoing range.

Principal dimensions of the locomotives are shown in the accompanying drawing. The bogies are of welded construction, composed of two I-section side-members connected by a hollow central bolster and light headstocks at each end. A laminated spring is slung under each axlebox, and its ends carry the bogie frame through the medium of adjustable vertical rods. The axleboxes have double-row S.K.F. roller bearings, and move in vertical guides.

Two twin-armature motors are carried in each bogie frame by a three-point suspension, two supports for each motor being on the bolster, and one on the headstock. Sécheron spring drives transmit the power to the axles. Spherical bearings in the bolsters accommodate pivots attached to the locomotive underframe, the tractive effort being transmitted through the frame by this means.

Laminated springs slung on the outside of the bogie side-members support bearing surfaces to carry the weight of the body on each bogie. A brake cylinder on each headstock applies two

* Part 1 appeared in our March 20 issue

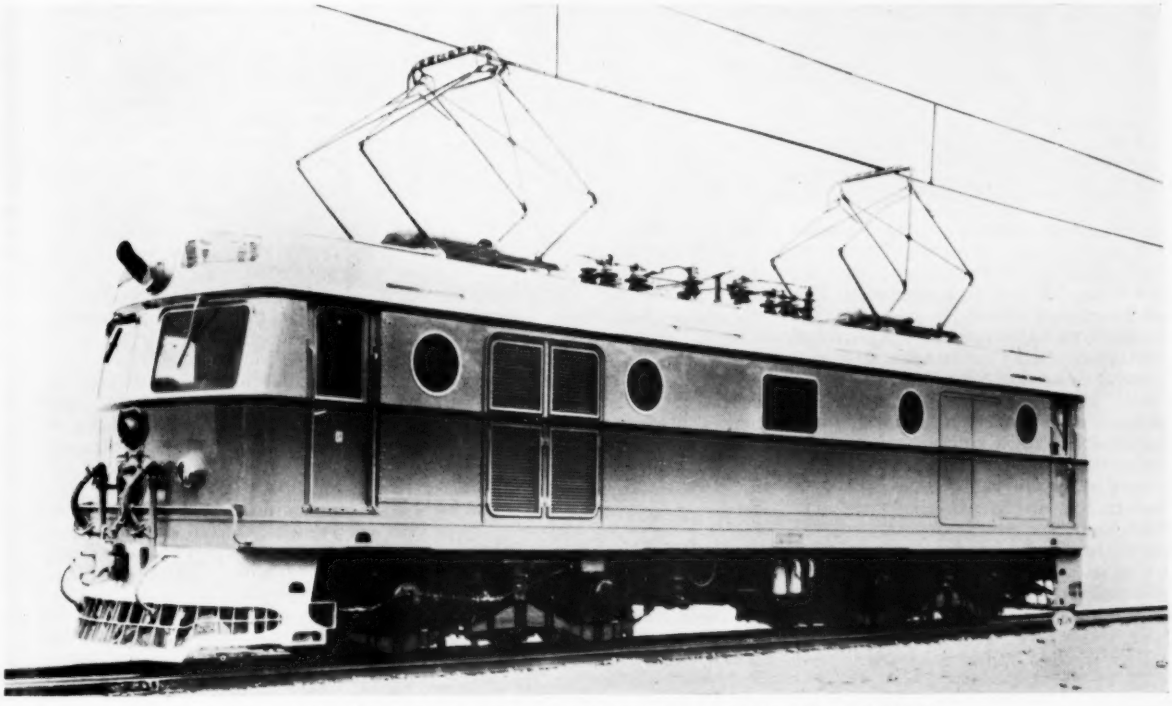


I-IV. Traction motors
1. Pantograph
2. Earthing switch
3. Pantograph isolator
4. Braking resistance
5. Lightning arrester
6. Circuit-breaker
7. Main transformer
8. Cooling oil pump
9. Control contactors
10. Equipment frame for Motor I
11. Equipment frame for Motor II
12. Equipment frame for Motor III
13. Equipment frame for Motor IV
14. Motor-blower for cooling oil
15. Transformer oil cooler
16. Filter for 15
17. Motor-blower for Motors I and II
18. Motor-blower for Motors III and IV
19. Battery
20. Motor-exhauster
21. Motor-compressor
22. Controller
23. Control couplers
24. Service charts
25. Air intake filter

Dimensions of Bo-Bo locomotive and layout of electrical equipment

blocks to each wheel of the adjacent axle. A sandbox is built into each corner of the bogie frame to serve the corresponding wheel.

The body is of the type in which the exterior covering contributes to its strength. A corridor connects the two driving cabs. Intakes, with filters, for the air required to cool the electrical machines are incorporated in the side panels. A removable central panel in the roof enables items of the interior equipment to be lifted out of the body. The rheostatic braking resistances are roof-mounted, and in common with other items on the roof are screened by a curved steel vallance running round the top of the locomotive. Weight in running order is 73 *tonnes*, or 18¼ tons per axle.



One of the 12 locomotives for operation between Jadotville and Tenke

Traction Motors

The four twin-armature traction motors have the following characteristics (the 1-hr. and continuous figures being similar):—

Shaft horsepower ...	2 × 210 h.p.
Voltage	2 × 240 V.
Current	850 A.
Rotational speed ...	1,580 r.p.m. (equivalent to 29·7 m.p.h. with half-worn wheels)
Max. rotational speed	2,330 r.p.m. (equivalent to 43·75 m.p.h. with half-worn wheels)
Gear ratio	1 to 6·93

At the above rating, the locomotive tractive effort is 9·25 *tonnes*. Each motor consists essentially of two machines side by side in a single frame. Both shafts drive a common gearwheel on a quill shaft running in bearings in the lower part of the frame. The gear-wheel consists of a toothed rim mounted on three radial arms incorporating seatings for the helical springs through which the torque is transmitted to the adjacent driving wheel. There is a similar arrangement of radial arms and springs, but without the toothed rim, at the other end of the quill shaft, which encloses the axle for the whole of its length between driving wheels. The spring elements, six in number at each end of the quill, are outside the driving wheels, and each bears at one end on a radial arm of the quill, and at the other on a support attached to the wheel disc.

The two motors of each assembly are permanently in series. The brush-holders are mounted on a rotatable ring. By releasing two clamps and operating a pinion, the ring can be moved so that each holder in turn comes into line with the inspection cover.

Power Circuits

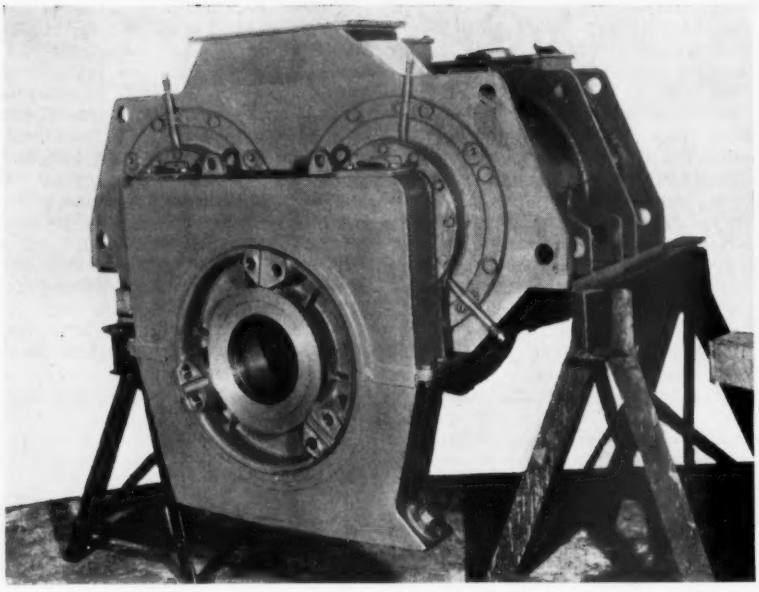
The main transformer is oil-cooled. A motor-driven pump draws oil from the upper part of the tank and returns it to the lower portion through a cooler in which air drawn from outside the locomotive by a fan is blown downwards through a horizontal system of finned tubes. Casings for the preventive coils are attached to the transformer tank and are included in the oil circulation system. The complete assembly comprising transformer, oil pump, cooler with fan, and contactor group is placed in position through the roof opening as a single unit.

Current is collected by either of two pantographs, and after passing through an oil circuit-breaker with both H.T. terminals above the roof, enters the body by way of the H.T. terminal of the main transformer. A special isolator, operated mechanically from inside the locomotive, enables both H.T. terminals of the circuit-breaker to be earthed. Both pantograph insolators, and the switch for cutting the lightning-arrester out of circuit, are also under mechanical control from within. The circuit-breaker is operated electro-pneumatically or by hand.

Sixteen electro-pneumatic contactors connected to tappings on the transformer secondary provide 15 running notches. Notching is automatic, under the control of a relay which by means of a resistance across its coil is arranged to provide three rates of acceleration. These are selected by a special handle on the driver's controller.

The main control handle, in addition to "off" and 15 running positions, has one "brake" position, which brings the rheostatic braking system into operation. Braking effort is then regulated by a separate control with three settings. Voltage relays across the motor fields detect the difference of potential if wheelspin occurs, and automatically effect a light air brake application on the slipping bogie. A hand-grip dead man's device is incorporated in the controller handle.

For rheostatic braking a separate resistance is connected across each pair of armatures. The traction motor fields are excited in series from a d.c.



Twin-armature traction motor of Jadotville-Tenke locomotive

machine with four field windings. One of these is separately excited from the locomotive battery, three degrees of excitation being obtained across a tapped resistance by means of contactors. In addition, the machine has a series winding, an opposing shunt winding, and another winding, also in opposition to the series turns, which is connected across the braking resistance of the motor on the leading axle and therefore receives an excitation proportional to the armature current of that machine. The effect is to maintain an approximately constant current over a certain speed range on each braking notch.

The traction motor interpole shunts adapt themselves automatically to the appropriate values for motoring or braking. They consist of a resistance in series with the primary of a transformer, a second resistance being across the transformer secondary. Both resistances and the inductance of the transformer are effective when motoring on a.c., but when the motor is generating as a d.c. machine the shunt consists effectively of a single resistance.

Auxiliaries and Braking

All auxiliary machines are driven by single-phase induction motors with split-phase starting. They comprise two motor-blowers for traction motor ventilation, one of them also driving a generator for battery-charging; two exhausters, one of which runs only for rapid release of the vacuum brake; two motor-compressors, a motor-blower and a motor-driven pump for the transformer oil cooling system; and an exciter for rheostatic braking.

The locomotive is equipped with an air brake and with apparatus for vacuum braking of the train. When hauling a train the vacuum brake control effects simultaneously a proportional application of the air brake, although the air brake can be cut out if desired. The air brake handle is close to the vacuum control and can be used independently when the locomotive is running light. During rheostatic braking the air brake is normally out of action, but becomes operative automatically if the vacuum handle is moved to "emergency," in which position sanding takes place well. For normal sanding it is necessary only to press downwards on the vacuum brake handle in any of its positions.

Extensive bench tests were made with three prototype motors in evolving the design fitted to these locomotives. The use of two armatures in series per motor has enabled all axles to be in parallel, which is necessary for an acceptable tractive effort/speed curve, while restricting the current to values usual in low-frequency a.c. practice. The armature voltage is kept to the range between 200 and 250 V. in which the transformer e.m.f. remains within bounds without it being necessary to depart widely from normal design standards.

Similar motors have been ordered by the French National Railways from the A.C.E.C. associate, Forges et Atéliers de Constructions Electriques de Jeumont, for three motor coaches and 15 locomotives to be used on the Valenciennes-Thionville electrification.

(*Concluded*)

ARNHEM - ZUTPHEN ELECTRIFICATION. — Electric working between Arnhem and Zutphen began on January 5 this year, as reported in our January 9 issue. No official opening train was run, however, as the Netherlands Railways have decided to defer the ceremonies until the Zutphen-Zwolle section is converted, which is due next month. The Arnhem-Zutphen section is double-track, except for the portion over the Ijssel bridge at Zutphen, which is single. There are 427 archover type standards carrying the traction conductors, 257 of concrete and the rest of steel, resting on 1,214 concrete foundations, partly buried in the roadbed. The greater number of these (inclusive of 183 so-called "anchoring foundations" to hold the supports for certain standards) were made some time ago in the Oldebrock permanent way stores concrete construction plant, now removed. These 1,131 items involved 1,580 cu. m. of concrete. The remaining 83 items were poured *in situ* on the line and required 390 cu. m. There are 75 km. (47 miles) of electrified track involved, covering the 27·5 km. (17 miles) of double line between Arnhem and Zutphen and certain sidings at the end and intermediate stations. Power for this newly electrified section comes from the Gelderland Province Electric Supply Company at Arnhem, at 10,000 volts a.c., which is transformed and converted to 1,500 volts d.c. in the substations at Dieren-Doesburg, Zutphen, and the existing one at Arnhem; the working of the equipment is remotely supervised and controlled by apparatus working on an impulse system similar to that used in automatic telephony selector systems. In view of the dangers that can arise from coming into contact with the overhead wires, some 60 warning boards and 100 warning "gates" at level crossings, guarded and unguarded, have been provided.

LOW-FREQUENCY ELECTRIFICATION IN GERMANY.—The electrification programme of the German Federal Railways provides for the electrification of nearly 3,000 route-miles which, together with the 1,000 route-miles or so already electrified, will amount to about a fifth of the total route-mileage of the Federal Railways. These lines carry nearly 50 per cent of the total passenger- and ton-mileage. Writing in *Internationales Archiv für Verkehrswesen*, Herr H. Fritsche, an Officer of the Stuttgart Region, comes to the conclusion that the reconstruction of the existing system from 16⅔ to 50 cycles would be too expensive, and that the co-existence of two different systems would be undesirable so that, on balance, the extension of the existing 16⅔ cycles system would still be the most economic solution. The same conclusion was drawn by Herr H. Nibler in a paper read last year at Munich Technical University.

SWITCHGEAR - DEMONSTRATIONS. — The General Electric Co. Ltd., recently gave a series of demonstrations of its latest design of distribution switchgear at Magnet House, Kingsway, London. The demonstrations were attended by over 250 engineers who included representatives from the British Electricity Authority, Ministry of Supply, Air Ministry, and consulting engineers.

Indian Railways Centenary Exhibition

Exhibits illustrating 100 years of progress in all branches of activity

(*From a Correspondent*)

The Prime Minister of India, Mr. Jawaharlal Nehru, inspecting a model of the locomotive coaling plant at Chitpore, Eastern Railway

APRIL 16 was the actual centenary date of the Indian railways and also the closing day of the exhibition at New Delhi which has been held to celebrate the event. The section of the exhibition devoted to railway equipment by foreign manufacturers was described in *The Railway Gazette* of March 13.

From the artistic and architectural points of view the exhibition was one of the finest held in the country. The approach to the exhibition was emphasised by an open circulating area having as background a wall in a sweeping curve decorated with colourful mural paintings, floodlit from below, depicting different modes of transport throughout the ages.

The main entrance was a novel feature, the large canopy being made to appear as if self-supporting. Its floodlit ceiling was decorated with rich colours in oriental design. Beside the entrance gates, two searchlights were trained vertically upwards.

In the centre of the exhibition stood the Pylon, 100 ft. high, each foot indicating one year of progress of the Indian railways. A large lantern at the top and spiralling lights around the column made the pylon a conspicuous object by night.

Indian Railways Pavilion

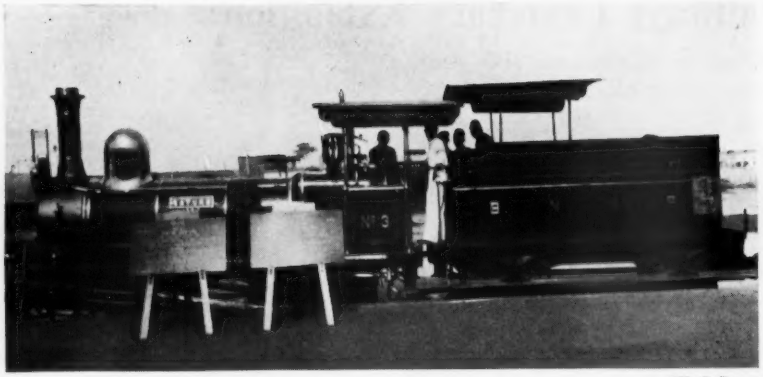
The Indian Railways Pavilion was the largest in the exhibition. Of modern and attractive design, its upper portion was decorated with mural paintings, done on Masonite sheets, cut out to suit their theme. In this pavilion the six systems comprising the Indian Railways displayed on separate stands models, charts and photographs depicting progress in various departments of activity. An Eastern Railway model layout told the story of the progress of railway signalling. Several hundred feet of track accommodated various station layouts each fitted with progressive types of interlocking and block instruments. One terminal, a single line station, was signalled with main and outer signals, while the other was a replica of Howrah (Calcutta) with a model power frame, illuminated diagram, track circuits, power-operated points and colour-light signals.

The Central Railway had a number of table models showing the recent realignment of tunnels on the ghats between Bombay and Poona. Some semi-precious stones discovered during the boring were on exhibition. Other railways had working model railways with signalling, models of locomotive shops, and remodelled stations. In the North Eastern section was a 00 gauge working model of the Darjeeling Himalayan Railway.

Pools in front of the pavilion were

Photo] H. C. Towers

Main entrance to exhibition flanked by wall with floodlit mural paintings



Photo] [H. C. Towers

Sharp, Stewart metre-gauge 0-4-0 *locomotive "Saturn," of* 1875

spanned by models of various types of bridges used on the railways.

The Indian Manufacturers' stand was in zig-zag shape, made out of the butterfly-shaped platform covering used on Indian railways. It was gaily decorated with coloured ropes, flags, and a striped awning. Nearby were the two pavilions for foreign manufacturers, in which the firms of 13 countries were represented.

The space between the foreign pavilions was the Forum, decorated with coloured fountains and a row of flagstaffs carrying flags of the participating nations. Here a large statue of a railway worker, specially sculptured for the occasion, looked over the exhibition grounds. A large illuminated railway map of India was also located in this area.

Further back, at the apex of the main triangular area, was the Open Air Theatre for exhibiting films and stage shows.

Rolling Stock Exhibits

On the right-hand side of the triangle were broad gauge and metre gauge railway tracks and platforms for exhibiting the various types of rolling stock, locomotives and carriages showing the various stages of their development during the last century. Among these exhibits was a composite coach model depicting the stages of lighting—oil lamps, gas lights, and finally electric lights. An interesting locomotive exhibit was the *Express*, the first locomotive to run on the former East Indian Railway (illustrated in *The Railway Gazette* of March 20).

A feature of special interest to young visitors was the opportunity of riding on a replica of the Darjeeling-Himalayan Railway, with its station, Kanchenjunga, named after one of the highest Himalayan peaks. Actual rolling stock from the railway was used at the exhibition.

The primary function of the exhibition, of course, was to give the public as much information about the railways as possible. Some of the exhibits afforded interesting glimpses into the past, such as the *Fairy Queen* locomotive which worked troop trains during the Indian Mutiny in 1857. *Saturn*, one of the earliest metre-gauge locomotives in India, was another survivor from the early days. Also on show was the 2-ft. gauge locomotive imported in 1895 as a "toy" for the boy Prince of Gwalior, who drove it on a 2 ft. gauge track in his garden. The fuel was sandalwood logs and chameli oil. In 1899 this locomotive began work on the first section of the Scindia State Railway.

Modern Locomotive Types

In sharp contrast with these early types were the latest "WG" broad gauge, and "YP" metre gauge locomotives; broad-gauge and metre-gauge air-conditioned tourist cars, hospital cars with surgery and wards; track recording, oscillograph and dynamometer cars, goods vehicles, and diesel-electric railcars.

Among the rolling stock was the saloon used by the Prince of Wales (later King Edward VII). A four-wheeler, 16 ft. by 7 ft., built at the Agra workshops of the then Rajputana Malwa Railway in 1875, it had an exterior colour scheme of chocolate, brown and white. It had a leather-sprung couch and a small circular chair, also leather-sprung, and lighting by means of oil lamps.

Opening Ceremony

The exhibition was declared open by the Prime Minister of India, Mr. Jawaharlal Nehru, on March 7, as reported in *The Railway Gazette* of March 27.

Mr. Nehru complimented the railway administration and the million railway workers for the fine job that they were doing for the Indian nation, and added: "Railways have always served as a key to big changes. Wherever a railway line was laid economic and social changes followed. Trade flourished. There were many places in India where this key had still to be applied," he said.

Earlier, Mr. F. C. Badhwar, Chairman of the Railway Board, observed that the exhibition had been organised to depict a centenary of railway progress and the part that railways played in the economic and industrial life of the country. He also paid tribute to the British railwaymen who had played an important part in building the railway system of India during the last hundred years.

Photo] [H. C. Towers

Taking water at Kanchenjunga station on the "Darjeeling-Himalayan" system in the grounds

B.I.C.C. OVERSEAS RECEPTION OFFICE.—British Insulated Callender's Cables Limited announces that with effect from March 31 last its Overseas Reception Office has been transferred to 11, Bedford Square, London, W.C.1. (Tel. Museum 1600). The Overseas Reception Office was formed in 1949, for the benefit of overseas visitors, as a place where they can obtain information of any kind, office work, and assistance in securing accommodation, travel, and recreational facilities.

Copying Lathe for Producing Mechanical Details

Capable of machining small batches or long production runs of rolling stock components

THE machine tool industry has given much attention recently to producing mechanical components by the copying method, by which a former plate or a prototype is used to reproduce an article similar in dimensions in every respect. Given certain production conditions the method offers many advantages, as it dispenses in part with the use of measuring instruments, making for easier and quicker production for both external turning and internal boring.

The principle is applicable for machining either short batches or long production runs. The method of set-up is extremely simple and only the change of the copying plate or prototype is necessary. A demonstration of this method of production has been held by Sydney G. Jones Limited, on a +GF+ copying lathe designed and manufactured by George Fischer Limited, of Schaffhausen, Switzerland, for which machines the firm is the sole agent in the United Kingdom.

During the demonstration one journal and wheel seat of a 4 ft. 8½ in. gauge, 10 in. × 5 in. journal, tender axle was machined in 30 minutes. Rough machining was carried out at a cutting speed of 480 ft. a minute, and the finishing at 580 ft. a minute. Carbide-tipped tools were used; the axles were received from the manufacturers finish faced on the axle ends and centred, and the rough forging was ¾ in. over size.

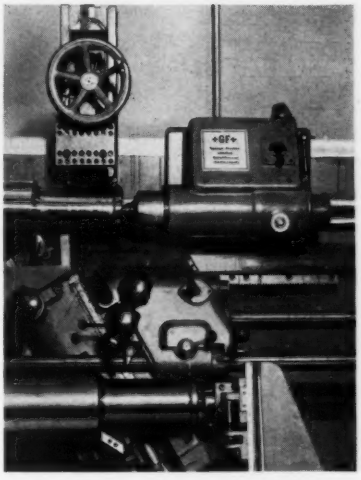
Features of Design

A feature of the +GF+ machine is the convenience and method of control, which have been designed with the object of reducing operator fatigue to a minimum. The main driving motor, transmission, electrical relays and so on are totally enclosed, and easily accessible by the removal of a cover plate. The entire hydraulic system is enclosed in the carriage; there are no exposed hydraulic tubes. Lubrication of the feed gears and copying slide is simplified. The oil is also used to actuate automatic functions—retraction of the cutting tool at the end of its cut, feed change, and rapid traverse of the carriage.

A rapid-traverse shaft drives the gear oil pump at constant speed. The pump draws up the oil from the lower part of the feed carriage, which serves as an oil reservoir, and feeds it into a lower, smaller chamber of the copying slide, designed to function as a differential piston. The oil flows through a choker passage into the larger chamber of the copying slide and back through a control valve into the oil reservoir.

Oil pressure in the chamber is nearly constant. As long as the tracer is not in contact with the copying template, the control valve is kept open by a spring. Consequently, there is no pressure in the chamber. The copying slide moves upwards until the copying template touches the tracer. This narrows the control aperture sufficiently to create a balance between the pressure in this chamber, and the constant pressure chamber in the lower part of the feed carriage, so stopping the motion of the copying slide.

When the tracer meets a rise on the copying template, the control aperture is reduced, and the pressure in the chamber increases sufficiently to move the copying slide downward. When, conversely, there is a depression on the template, the spring opens the control aperture, the pressure in the larger chamber falls, and the constant pressure in the lower smaller chamber moves the copying slide upwards until the balance of pressure is re-established.



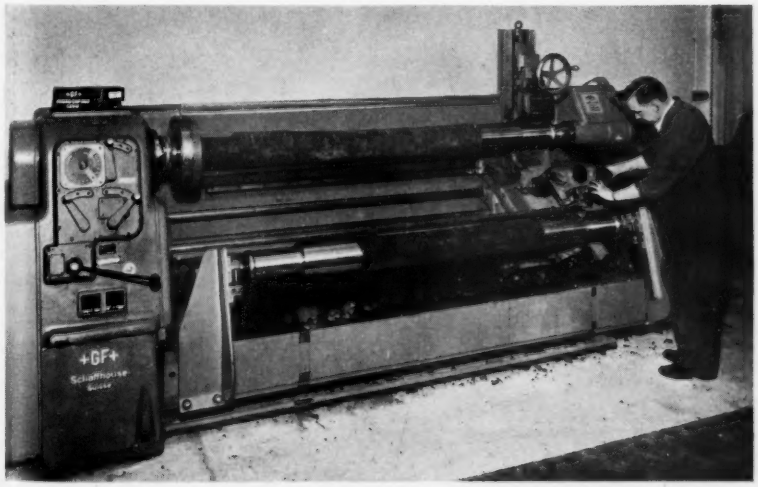
A close-up of the copying mechanism

The feed drive is mechanically transmitted by gear through a reversing clutch and worm-gear rack. The reversing clutch is hydraulically operated, as is also a shifting device which can reduce the feed at any time by one half. The device is controlled either by hand, or automatically, by means of stops, any number of which can be applied. The rapid reverse shaft is connected to a hydraulically-operated clutch with the feed worm-gear, and provides rapid traverse in either direction.

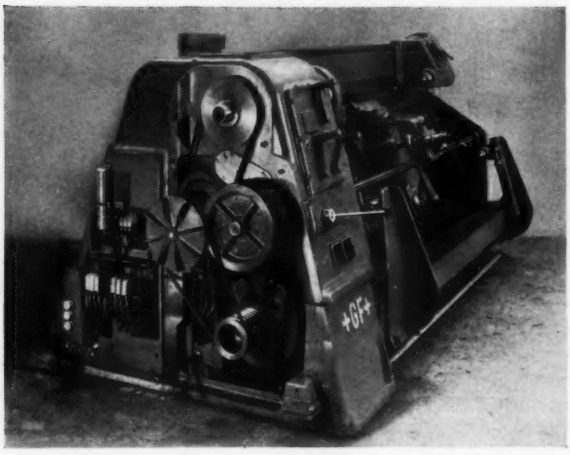
As contact pressure of the tracer against the template is of the slightest templates can be cut from unhardened steel. They are made in a scale of 1 to 1 and can be quickly changed. The template holder or prototype is mounted between the centres of two supports. Micrometer scales provide accurate vertical and horizontal adjustment; adjustment is required only for the first piece of each run. To obtain the maximum efficiency from the machine it is necessary to use turning tools correctly made and adapted to the specific work for which they are intended. Tracer and tool have the same point radii.

Two reversible tracers with a point radius of 0·06 in. and 0·02 in. respectively are supplied with the machine. According to the work to be done, a copying, rough copying, or finish copying tool is used. The top rake angle, grade of carbide, and the chip breaker must be adapted to suit material to be machined.

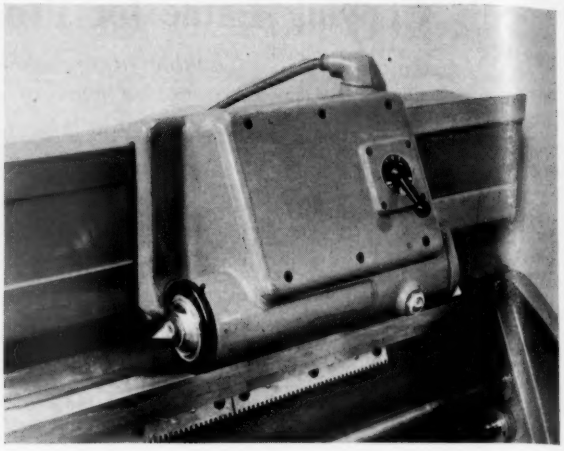
To obtain a high metal removing rate when machining forgings with various turning allowances, and to avoid dam-



Machining the journal and wheel seat of a standard gauge tender axle from a prototype



Cover removed, showing the driving mechanism



Motor-operated tail stock with built-in motor

age to the turning tool when plunge copying, an automatic feed-change with a ratio of 2 to 1 is used. It also ensures a uniform surface finish on right-angle shoulders, and provides for various degrees of finish which may be required during the same turning operation. For internal copying, depending on the work to be done, one or two copying templates are used, in which case the upper copying tool cuts towards the head stock, and the lower towards the tail stock.

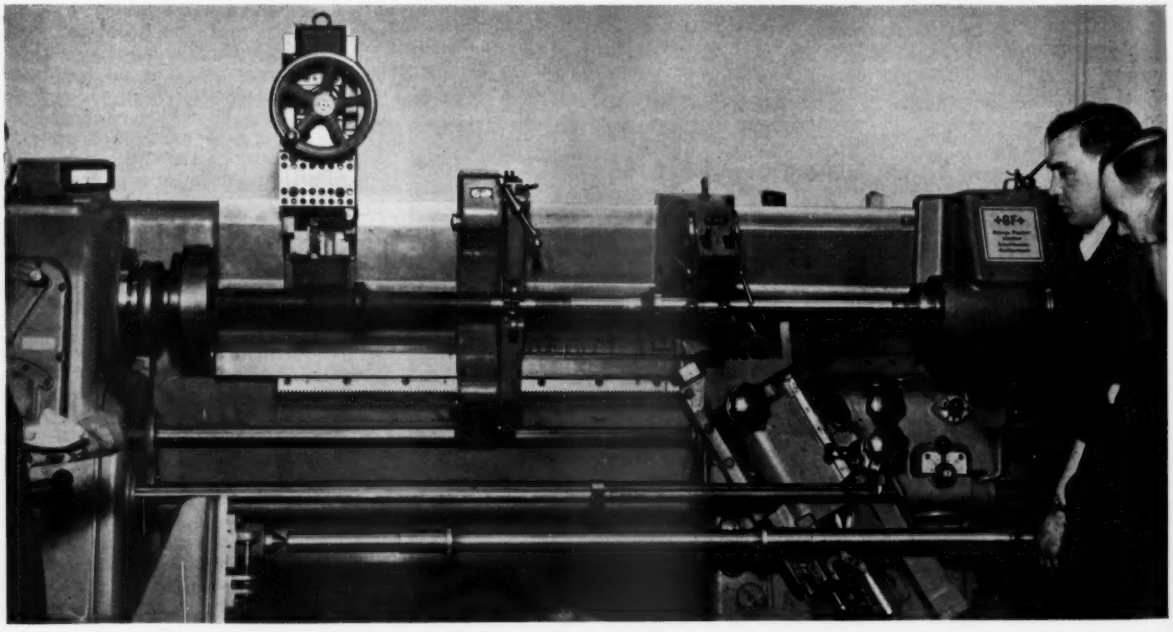
Method of Driving Work

The normal type of carrier used for centre lathe work is not used. A hood containing three or six driving cams, for light or heavy duty respectively, is mounted on the adaptor plate. A slight rotation by hand of the hood grips or disengages the work. The driving force supplied is proportional to the cutting pressure, ensuring a positive non-slip drive, for any diameters up to $8\frac{1}{16}$ in., irregular shapes can also be accommodated.

A motor-operated tail stock, actuated by a built-in motor through a gear and spindle is provided. A hand switch reverses the poles on the motor, pre-selecting the direction of the tail stock motion. Travel of the tail stock in the pre-selected direction is by foot treadle switch, and the motor stops automatically as soon as the barrel exerts the necessary pressure pre-determined by a spring. Release of the tail stock by inadvertent use of the foot switch is not possible; an ampere meter is fitted which permits constant check of the load on the motor.

The +GF+ copying lathes are manufactured in nine different sizes, with turning length capacities from 2 ft. 4 in. to 11 ft. 6 in. with a maximum turning diameter of 1 ft. 2 in. The supplementary equipment includes hydraulic and hand-operated infeed attachments, roller steadies, pneumatic chucking devices and so on.

LONDON TRANSPORT NEW COUNTRY AREA BUS.—With the completion of deliveries of the new "RF" type single-deck buses for the Central Area routes of London Transport, a start has been made on introducing these vehicles on nearly 50 routes in the country area. The first "RF" in green Country Bus livery has gone into service on route 447 (Reigate-Woldingham). The buses are 41-seaters with M.C.W. all-metal bodies on A.E.C. Regal Mk.IV underfloor-engine chassis. On completion of the order later this year, London Transport will have some 700 single-deck vehicles of this standard basic design.



Copy machining a locomotive valve spindle, showing roller-steady application

RAILWAY NEWS SECTION

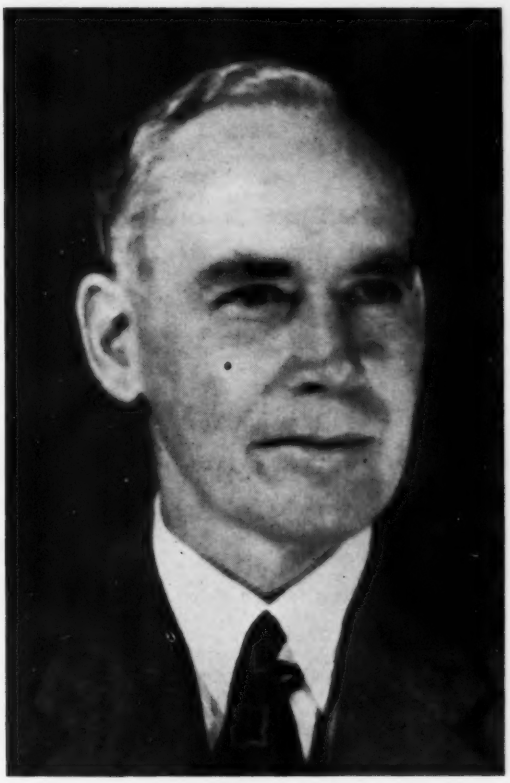
PERSONAL

Mr. P. L. N. Ghilain, Directeur du Matériel et des Achats, Belgian National Railways, has retired. He has been succeeded by Mr. Albert Bouckaert, Chef et Adjoint au Directeur du Matériel et des Achats.

Mr. J. Scheerens, Conseiller à la Direction Générale, has retired after 45 years' service.

Mr. T. Austin

Elected President, Institution of Railway Signal Engineers, 1953



Mr. F. J. McIntosh

Appointed Chief Engineer, Rhodesia Railways

Mr. T. Austin, elected President of the Institution of Railway Signal Engineers on April 8, is the son of a stationmaster on the former Midland Railway and a native of Keighley, Yorkshire. He received his technical education at Lancaster, Derby, Nottingham and Birmingham, specialising in telecommunications and power transmission. Joining the Telegraph Department of the Midland Railway as an apprentice, under Mr. J. Sayers, he served on the outdoor maintenance staff and then as Technical Assistant in the Department's laboratory at Derby. In 1920 he joined the railway signalling department of the General Electric Company Ltd. in London as Works Technical Assistant. On the formation of the Siemens & General Electric Railway Signal Co. Ltd. in 1926 he was appointed its Chief Assistant Engineer and in April, 1930, succeeded Mr. James Boot as Chief Engineer. He has been concerned with many notable developments in railway and road traffic signalling and has taken an active and responsible part in his company's achievements, which extend to many countries. A member of the Institution for 33 years he was elected a Member of Council in 1942 and for the last two years has been a Vice-President. For seven years he has acted as Hon. Secretary of the Papers Committee and was responsible for arranging all the Institution's technical meetings. He is an Associate Member of the Institution of Electrical Engineers.

Mr. F. J. McIntosh, B.Sc., A.M.I.C.E., who, as recorded in our February 20 issue, has been appointed Chief Engineer, Rhodesia Railways, was born in South Africa and educated in Pretoria and University College, Johannesburg (now Witwatersrand University), where he obtained a B.Sc. degree in engineering in 1922. Before entering the Rhodesia Railways in September, 1924, as a Junior Assistant Engineer, Mr. McIntosh worked for two years on the Railway Location Survey in the Union of South Africa. He served as Assistant Engineer in Southern Rhodesia, Northern Rhodesia and Portuguese East Africa, including a period of one year as Resident Engineer on the construction of the Copperbelt Branches in 1928 and two years as Assistant Engineer in charge at Beira from October, 1929, to November, 1931. Following periods as Assistant Engineer at Broken Hill and Salisbury, Mr. McIntosh was appointed Acting District Engineer, Broken Hill, in September, 1944. He was confirmed in this appointment in October, 1945, and transferred to Salisbury as District Engineer in October, 1946. After periods of acting as Deputy Chief Engineer in 1949, Mr. McIntosh was appointed Deputy Chief Engineer, Administration, in January, 1950, and Deputy Chief Engineer in September, 1950. He officiated as Chief Engineer for two months in 1951, and from May to November in 1952. Mr. McIntosh was appointed Chief Engineer on January 9, 1953.

Mr. J. H. Dudley, Deputy Motive Power Engineer, Coras Iompair Eireann, has been appointed Running Superintendent.

Mr. M. J. Devereaux, Assistant Locomotive Superintendent at Limerick, has been appointed Assistant Running Superintendent.

U Kyi Win, Chief Engineer, and U Yone Mo, Chief Mechanical Engineer, are representing the Burma Railways on a Burmese Government Purchasing Mission which, arriving in Washington on April 19 and leaving on April 22, will be visiting the United Kingdom between May 5 and May 25, 1953. In addition to representing the Burma Railways, U Kyi Win is acting as Secretary to the Mission, which will be under the leadership of the Minister of Public Works and will include representatives of the Shipping Board, and of the Irrigation, Agriculture, Inland Water Transport and Building & Works Departments. The Mission's object will be to buy capital goods and machinery.

Mr. F. A. Benger
Appointed Chief of Motive Power & Rolling Stock, Canadian Pacific Railway

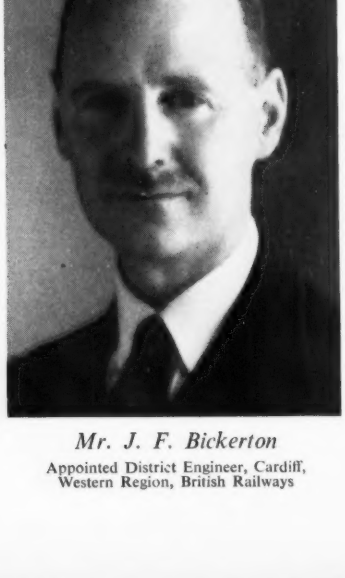
Mr. Angel del Rosaria Villarreal
Appointed Chief of Traffic Department, General Belgrano Railway, Argentina

Mr. G. Y. Mangrulkar
Engineer-in-Charge, Kandla-Deesa Railway Construction

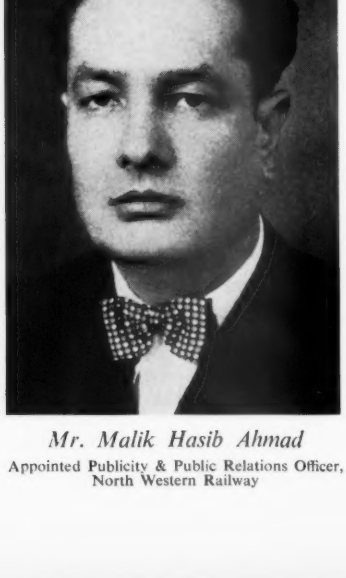
Mr. F. A. Benger, Assistant Chief of Motive Power & Rolling Stock, Canadian Pacific Railway, who, as recorded in our April 10 issue, has been appointed Chief of Motive Power & Rolling Stock, in succession to the late Mr. W. A. Newman, has had jurisdiction over all branches of mechanical engineering for the railway's diesel and steam locomotives, cars and power plants, as well as supervision over standards and methods. Mr. Benger designed the 1944 production of "1200" class light Pacific-type locomotives. These locomotives were the first to be designed and built by the C.P.R. since 1931, and were produced in the face of very great obstacles during the war years. Since 1948 much of his time has been spent overcoming the early problems of diesel operation in Canada. Mr. Benger became Assistant Mechanical Engineer in 1923 and, in 1941, was appointed Assistant Chief Mechanical Engineer. He took over as Chief Mechanical Engineer in 1946, and was appointed Assistant Chief of Motive Power & Rolling Stock in 1948. He is a member of the American Society of Mechanical Engineers.

Mr. Angel del Rosario Villarreal, who, as reported in our March 20 issue, has been appointed Chief of the Traffic Department of the General Belgrano Railway, started his railway career in 1912 at the Las Chañaritos station of the Central Córdoba Railway. He resigned in 1914 and joined the Argentine Northern Railway at Cruz del Eje. He was transferred to the Superintendent's office at Santa Fe in 1919, where he passed through all departments, ultimately becoming Chief of the Claims & Rates Office, from which post he was promoted to Traffic Inspector & Commercial Agent in Alta Córdoba. Two years later he was transferred to the Puerto Madryn line in Patagonia, and after three years in this post and a further two years in the Superintendent's office in Santa Fe, he was appointed Traffic & Movement Superintendent in San Antonio Oeste, Retiro and Santa Fe successively. On January 1, 1952, he became Chief of the Commercial Division at headquarters, from which position he has now been promoted to Chief of the Traffic Department.

Mr. G. Y. Mangrulkar, Engineer-in-Charge, Kandla-Deesa Railway Construction, was born at Sausar, Central Provinces, India, on January 16, 1904, and graduated in engineering from the Engineering College, Benaras in 1926. After serving in local firms at Nagpur, he joined the North Western Railway of India as Assistant Executive Engineer. After serving for one year on track maintenance, etc., Mr. Man-



Mr. J. F. Bickerton
Appointed District Engineer, Cardiff, Western Region, British Railways



Mr. Malik Hasib Ahmad
Appointed Publicity & Public Relations Officer, North Western Railway

Mr. S. M. Khurshid
Publicity & Public Relations Officer, North Western Railway, 1949–1952

grulka was posted as Assistant Engineer on the construction of the Sind Right Bank Feeder Railways. Three years later, he was transferred as Sleeper Passing Officer and Assistant Controller of Stores at Lahore, N.W.R. He was subsequently appointed Assistant Bridge Engineer in charge of designs and construction works at Lahore. In 1938 he was appointed Assistant Engineer on the reconstruction works at Quetta. In 1941 he was promoted Executive Engineer (Senior Scale), and worked as Divisional Engineer & Divisional Personnel Officer until 1946, when he was selected for the post of Superintendent of Works and placed in charge of the Final Location Survey of the Bombay-Sind Railway Connection (Broad-Gauge) through Cutch. Mr. Mangrulkar transferred to the Bombay Baroda & Central India Railway (now the Western Railway) at Bombay after partition, and, in November, 1947, he was promoted to Deputy Chief Engineer, Maintenance, on the same system. From October, 1948, he worked as Deputy Chief Engineer (Surveys) and was in charge of the Final Location Survey of the proposed metre gauge rail-link to connect Deesa with Kandla. He was appointed Engineer-in-Charge of the construction of this project in 1949.

Mr. J. F. Bickerton, B.Eng. (Liverpool), M.I.C.E., Assistant District Engineer, Paddington, Western Region, British Railways, who, as recorded in our March 20 issue, has been appointed District Engineer, Cardiff, was educated at Oswestry High School and Liverpool University. He began his railway career as a pupil to the Chief Engineer of the Cheshire Lines Committee under whom he was subsequently appointed Assistant Engineer. In 1927-28 he was engaged on waterworks construction in Buenos Aires as Resident Engineer, and in 1928-30 was appointed Superintendent Engineer on constructional works in Spain. Joining the Great Western Railway in 1930 as Assistant in the New Works Section of the Chief Engineer's Department, he became Assistant Resident Engineer, and later Resident Engineer, first on the reconstruction of Temple Meads Station and other related work at Bristol, and subsequently on a number of contracts for construction works, including the remodelling of Hockley Goods Station, Birmingham and the locomotive depot at Severn Tunnel Junction. Other wartime improvements schemes in which Mr. Bickerton was engaged included the widening of lines to Winchester and Andover. He was appointed Assistant District Engineer, Paddington, in 1949.

Mr. Malik Hasib Ahmad, who, as recorded in our December 26 issue, has been appointed Publicity & Public Relations Officer, North Western Railway, Pakistan, has had a varied career. Before joining Pakistan Railways he was Director, All India Radio; Deputy Director, Punjab Public Relations Directorate; Chief Executive Pancholi Art Pictures; and Public Relations Officer, Thal Development Authority (Punjab Government). Mr. Malik is one of the pioneers of documentary films in the Indo-Pakistan sub-continent, and was deputed by the Punjab Government to help Mr. Alexander Shaw, of London, to compile a report on the Pakistan film industry for UNESCO. He is also keenly interested in dramatic productions and acting, and is the author of many plays and features.

Mr. S. M. Khurshid, who, as recorded in our December 26 issue, has relinquished the position of Publicity & Public Relations Officer, North Western Railway, Pakistan, has had a long association with this railway administration. He joined the railway in the Personnel Department, and was Assistant Secretary to the General Manager, dealing with establishment at Headquarters. After an overseas training course in welfare he was posted as Senior Welfare Officer. In March, 1949, he took over as Public Relations & Publicity Officer. He is now posted as Officer on Special Duty (Food), providing liaison between the Railway Administration and the various Provincial Governments to ensure that railway employees receive their share of food grains in the rationing and provisioning schemes of the Provincial Authorities.

On attaining the age of 65, Mr. Eric Coleby, Legal Adviser to the Railway Executive, in the Legal Service of the British Transport Commission, will retire from the Commission's service on May 9.

Mr. D. N. Chetty has been appointed Technical Adviser (Boilers), Ministry of Works, Government of India, Bangalore.

Mr. C. W. Hunter, Chief of Traction, Ferrocarril Nacional General San Martin, Argentina, has resigned.

Mr. O. P. C. Collier, General Manager, Eritrean Railways, has relinquished his position on the termination of the British Administration of Eritrea.

Mr. G. K. Wood, Chief Mechanical Engineer, Sudan Railways, is on leave in this country. He returns to the Sudan on July 29.

Mr. Wilfred Huddleston, Assistant General Storekeeper, Toronto, Central Region, Canadian National Railways, has been appointed General Storekeeper, Winnipeg, Western Region, succeeding the late Mr. A. Munro.

We regret to record the death in an air crash near Dar-es-Salaam, East Africa, on March 30, of Dr. Guterlac Wilson, senior partner in Messrs. Scott & Wilson, Consulting Civil Engineers.

We regret to record the death on March 25, at the age of 82, of Mr. George E. Graham, a former Vice-President & General Manager of the Dominion Atlantic Railway.

Mr. D. D. Gray, Head Locomotive Draughtsman, British Railways, Eastern & North Eastern Regions, Doncaster, is retiring on April 18, 1953, after almost 50 years' service.

We regret to record the death on April 2, at the age of 60, of Mr. R. T. Clews, Assistant Motive Power Superintendent, Euston, London Midland Region, British Railways, until his retirement, due to ill-health, in 1948. Mr. Clews commenced his railway career in 1913, and, after serving with H.M. Forces in the 1914-18 war, held the position of District Locomotive Superintendent at Belle Vue, Shrewsbury, Patricroft, Toton and Rugby. He took up his appointment at Euston in 1940. He was for five years Chairman of the Management side of the Sectional Council No. 2 Sub-Committee.

Sir Philip Johnson is relinquishing his position of Managing Director at the St. Peter's Engine Works of R. & W. Hawthorn, Leslie & Co. as from April 30. He will retain the Deputy-Chairmanship of the company and will continue to take an active part in the company's affairs. As from the same date Mr. John Bulman will be appointed Managing Director of the St. Peter's Engine Works, and Mr. D. G. Ogilvie, at present Works Manager, will take up the position of General Manager.

Mr. C. N. Kington, Chief Engineer & Administration Officer, Sheffield Laboratories, British Iron & Steel Research Association has been appointed Group Manager.

Mr. Charles L. Hill, Deputy Chairman, Heenan & Froude Limited, has been elected Chairman in succession to the late Mr. A. P. Good. Mr. F. J. Fielding, Managing Director, has been appointed Deputy Chairman.

Mr. E. G. O. Ridgwell, Packaging Controller, the General Electric Co. Ltd., has been appointed Manager of the company's newly-amalgamated transport and packaging departments.

Mr. Charles F. Venrick, Assistant to the Vice-President & Contracting Officer for the Ordnance Division, American Locomotive Company, has been appointed Manager, Alco-GE Locomotive Sales & Field Service, and Mr. Ralston A. Weston, Manager of Stationary & Marine Diesel Engine Sales.

The Rt. Hon. the Viscount Caldecote, D.S.C., M.A., has been elected a Director of the English Electric Co. Ltd.

Mr. E. H. L. Cooper has been appointed General Works Manager of Henry Meadows Limited, Wolverhampton. Mr. J. R. Threlfall has been appointed Production Manager; Mr. G. Metcalfe, Production Controller; Mr. D. E. Mallet, Chief Inspector; and Mr. H. D. Prescott, Assistant Chief Inspector.

Mr. W. A. Brooks has been appointed Assistant Chief Draughtsman, W. G. Bagnall Limited, Stafford.

Mr. R. J. Hillard, C.M.G., whose retirement as General Manager, Sudan Railways, was recorded in our January 2 issue, has been appointed an additional Director of the Tunnel Portland Cement Company.

Mr. C. E. Prosser has been appointed chairman of the Metals Division of Imperial Chemical Industries Limited, in succession to Mr. H. E. Jackson, who is retiring.

Mr. Mark R. Reeve has resigned from the board of Tube Investments Limited in order to take up another appointment. He will relinquish his appointments with the Group's subsidiaries on June 30.

Dr. Denis Rebbeck, a Director of Harland & Wolf, has been appointed Deputy Managing Director. Mr. H. C. MacEwan, Electrical Manager, and Mr. W. H. Park, Shipyard Manager and Head of the Steel Constructional Department, have been appointed to the board.

Sir Henry Wilson Smith, a Director of the Vacuum Oil Company, has been appointed Chairman of an independent committee to review the long-term problems of duty-free entry of machinery into the U.K. Sir Henry is a director of a number of other companies, including Powell Duffryn, Cory Brothers & Co. Ltd., and Guest Keen & Nettlefolds Limited, and is a Vice-Chairman of Stephenson Clarke Limited.

British Transport Commission Statistics. (Period No. 2)

Summary of the principal statistics for the four-week period ending February 22

STAFF

—	B.T.C. Head Office	British Railways	London Transport	British Road Services (Road Haulage)	Road Passenger (Provincial & Scottish)	Hotels & Catering	Ships & Marine	Inland Waterways	Docks, Harbours, Wharves	Railway Clearing House	Commercial Advertisement	Legal	Films	Total
Number ...	284	601,474	96,697	70,899	60,673	15,167	6,092	4,747	20,805	555	198	322	43	877,956
Inc. or dec.	−3	−171	−110	−815	−31	−27	−5	−26	+10	−7	−1	−1	+2	−1,185

BRITISH TRANSPORT COMMISSION TRAFFIC RECEIPTS

—	Four weeks (Period No. 2)		Aggregate for 8 weeks	
	1953	1952	1953	1952
	£000	£000	£000	£000
British Railways—				
Passengers	6,349	6,328	12,707	12,378
Parcels, etc., by passenger train	2,759	2,650	5,372	5,117
Merchandise	8,337	8,512	16,150	16,471
Minerals	3,456	3,291	7,046	6,574
Coal & coke	9,062	8,271	17,424	16,226
Livestock	109	128	218	211
	30,072	29,180	58,917	56,977
British Railways— C. & D. and other road services	875	892	1,728	1,739
Ships and Vessels	522	573	1,131	1,157
London Transport—				
Railways	1,335	1,217	2,735	2,446
Buses & coaches	2,788	2,513	5,626	5,031
Trolleybuses & trams	661	660	1,330	1,325
	4,784	4,390	9,691	8,802
Road Passenger Transport	3,077	2,870	6,284	5,774
British Road Services— Freight charges, etc.	5,980	5,935	11,628	11,740
Docks, Harbours & Wharves ...	1,188	1,212	2,328	2,396
Inland Waterways	176	176	352	346
Hotels & Catering	1,113	1,085	2,253	2,213
Total	47,787	46,313	94,312	91,144

LONDON TRANSPORT

—	Passenger journeys	Inc. or dec. per cent over 1952	Car miles	Inc. or dec. per cent over 1952
	000		000	
Railways	43,735	−8·2	16,404	−5·0
Buses & coaches	210,855	−4·9	26,742	+1·1
Trolleybuses & trams	55,283	−15·9	5,726	−12·2
Total	309,873	−7·5	48,872	−2·7

INLAND WATERWAYS

Tonnage of traffic and ton miles

—	Tonnage	Inc. or dec. per cent over 1952	Ton miles	Inc. or dec. per cent over 1952
	000		000	
Coal, coke, patent fuel & peat	533	+1·2	7,670	+5·5
Liquids in bulk	167	+3·5	4,258	+8·0
General merchandise	299	−13·1	4,946	−6·0
Total	999	−3·2	16,874	+2·4

BRITISH RAILWAYS

Rolling Stock Position

—	Operating stock	Number under repair	Available operating stock	Available operating stock in 1952
Locomotives	19,011	3,348	15,260	15,523
Coaching vehicles	57,536	6,099	51,437	52,326
Freight wagons...	1,120,786	78,212	1,042,574	1,056,020

BRITISH RAILWAYS

Passenger Journeys (Month of January, 1953)

Full fares	Excursions, cheap day, etc.	Other descriptions	Early morning and workmen	Season tickets	Total	Inc. or dec. per cent over 1952
16,076,000	17,450,000	3,024,000	17,060,000	33,206,000	86,816,000	−2·9

BRITISH RAILWAYS

Freight Tonnage Originating and Estimated Ton-Miles (Period No. 2)

—	Merchandise	Minerals	Coal & coke	Livestock	Total	Inc. or dec. per cent over 1952
	000	000	000	000	000	
Tons originating ...	3,860	4,827	14,336	44	23,067	+0·6
Ton-miles	541,134*	412,524	888,198	—	1,841,856	+1·9

* Includes livestock

BRITISH RAILWAYS (Period No. 2)

—	Total steam coaching train-miles	Total electric coaching train-miles	Total freight train-miles	Freight train-miles per train engine-hour	Net ton-miles per total engine-hour	Locomotive coal consumption	
						Total tons	Lb. per engine-mile
1953	13,517,000	3,716,000	11,302,000	8·32	614	1,070,000	65·3
1952	13,388,000	3,736,000	11,198,000	8·22	593	1,094,000	66·6

The Institution of Railway Signal Engineers

Interference from electric power lines and traction circuits

At a well-attended meeting of the Institution of Railway Signal Engineers, held in London on January 13, Mr. T. S. Lascelles, President, who was in the chair, announced that they were honoured by having among them that evening three distinguished visitors: Monsieur Roman, of the French National Railways; Monsieur Duviol, International Union of Railways, and Mr. Millard, of the Railway Executive Continental Committee. He also welcomed members of the Post Office Engineering Department and other guests accompanying Mr. Dennis R. Turner, who was reading a paper that evening on "Interference from Electric Power Lines and Traction Circuits," a subject which had not been covered by the Institution before and which, with the continued spread of electric power, was becoming more and more important.

The paper, illustrated by slides, dealt with the factors involved, such as danger to personnel and disturbance to functioning of circuits; mode of energy transfer; danger from direct contact; G.P.O. tests to determine the effect of dropping an energised high-voltage power conductor on to an overhead telephone route, the results being demonstrated by an interesting film lent by the G.P.O. Research Department; influence of earth resistance on inductive interference; electric induction; effect of insulation resistance on electrically induced voltage; flow of earth current; earth potentials; electro-magnetic coupling; effects of longitudinally induced voltages; screening; three-phase power lines; routine calculations of longitudinal electro-magnetic induction; loop voltage of a pair of wires; noise; and remedial and precautionary measures.

The discussion was opened by Mr. J. H. Fraser, who referred to the importance of the subject. It was not, perhaps, always realised that we were on the threshold of great things in which the question of interference would rank high. Electrification was the coming thing in all countries of Western Europe, and it appeared as though a.c. electrification was going to be in the forefront. That brought signalling people into difficulty at once, as it meant very high voltages on open wires.

Mr. H. C. S. Hayes, of the Post Office Engineering Department, said that the episodes shown in the film were not the sort of thing they tried to arrange normally, but the tests had been made to find out what would happen under contact conditions. The film was the result of close liaison between the Post Office Engineering Department and the Electrical Research Association. It might be concluded from the film that some serious damage was done, but it had to be remembered that the time of operation of the circuit breakers was adjusted to be unduly long. He believed that 2·9 sec. was the period used in the third test. That was rather long compared with modern equipment, where he thought the time was nearer 0·1 sec. The damage, as seen in that test, was not normally to be expected. They did not suffer very much from electric induction; most of their troubles were because of magnetic induction. They did not often encounter power lines under a.c. conditions, where signalling lines ran in close proximity. Fortunately, they had quite a big separation as a rule.

Mr. F. Burton felt that if the assumptions and the basis of the calculations of interference from exposure to power transmission lines were acceptable to all parties concerned, it should result in agreement as to the protective measures to be adopted and acceptance by the Electricity Authority of the cost of such protection. He believed that the latter did not always agree on the extent of the cabling proposed by the railways or on the amount of metallicisation of earth return railway circuits necessary to cover an exposure to power line interference. It might be difficult, for example, for the power undertaking to appreciate the need to metallicise block circuits to the limit of block switching, which might easily extend ten miles or more.

Apart from the major power line faults of short duration and causing intense interference, troublesome effects arose from three-phase power systems because of unbalanced load which might not greatly exceed normal working conditions.

Referring to the formulæ for calculating the various types of interference, Mr. Burton asked if Mr. Turner could say whether the presence of the running rails of a railway between the terminal points of a grid power line affected the normal earth resistivity value. Earth current was shown as generally following the path of the a.c. power line. Did Mr. Turner find this modified by the presence of a railway in the vicinity, so that the rails formed part of the power line earth return and conveyed part of the residual, when the three-phase load was out of balance? His Region had experienced troublesome interference with railway circuits in three instances, in each of which a.c. currents were detected in the rails, even in sections where there was no exposure to aerial power conductors.

Mr. Burton proceeded to describe the three cases, as a result of which it had been considered that the effects of serious power line faults of short duration were attributable mainly to electric and electromagnetic induction, but where interference was a consequence of load unbalance not very much exceeding the normal working of the power line, earth conduction appeared to be a definite factor in the disturbance and supported the case for metallicisation of earth return circuits when protective measures were under consideration.

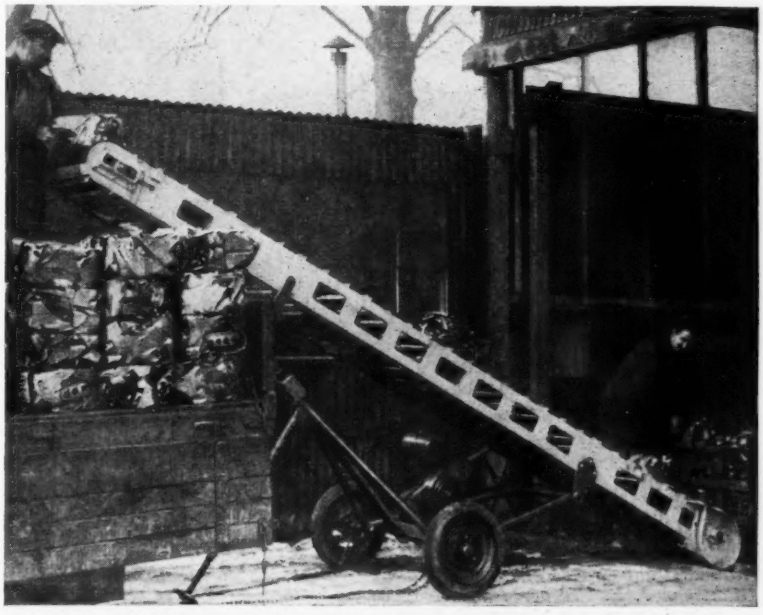
After Mr. Turner had replied to the points raised, a vote of thanks to him was moved by the President for the work involved in preparing his paper.

General Purpose Power Loaders

Suitable for use on railway and dock premises

Two new machines for a great number of lifting tasks now ready for marketing through the Lister Auto-Truck Sales of R. A. Lister & Co. Ltd., are the Lister 16-ft. and 24-ft. general purpose power loaders. The 16-ft. type has a maximum delivery height of 12 ft., and the 24-ft. type of 18 ft.

Built to lift cases, bales, sacks, crated packages, and certain types of unpacked merchandise, the loaders can be used *inter alia* in railway depots and at ports. A feature of the design is lightness in construction, combined with great strength and manœuvrability. The balancing enables one man to move and position the machine for correct loading and delivery. Approximate weight of the 16-ft. type is



Packages travelling up the moving platform of the new Lister power loader

7 cwt. and of the 24-ft. type 10 cwt. The moving platform of the loader consists of wooden slats bolted to heavy welded steel-link chain. These slats carry the load instead of pushing it up as is the case with the "fixed bed" type of elevator. To the wooden slats are fixed removable angle irons, which allow of handling various types of goods. The angle irons are used for loading cases, bales, or sacks, but an adjustable attachment is fitted when dealing with unpacked material.

Two strong wooden side boards are fixed on each side, but can be removed easily. Raising and lowering the platform is by the patented device of a mechanically operated telescopic tube which adjusts the height with little physical effort. The 24-ft. type loader is fitted with a double-action telescopic tube to give the necessary extra lift. For stability during loading, there is an adjustable telescopic stand.

Drive is provided by a 2½-h.p. air-cooled petrol engine, though electric motor drive can be fitted if desired. The moving platform is started and stopped by a combination of belt guide jockey pulley and clutch. The main drive between the jockey pulley and the platform is by two V-belts. Platform speed is about 100 ft. a minute. Pneumatic tyre wheels are fitted.

New Flats for African Staff, East African Railways

When opening the first block of three-storey flats for African employees of the East African Railways & Harbours in Nairobi on March 16th, Mr. A. Dalton, General Manager, said that the Administration employed more than 50,000 persons throughout East Africa and had to provide housing for all of them. The greatest number of staff requiring to be housed in Nairobi is in the African junior section where there is a shortage of over 2,000 dwellings. During the war all house building was stopped, and few houses have been built since because of land difficulties.

In examining the housing problem amongst African employees in Nairobi, said Mr. Dalton, it was seen in 1948 that if the Administration was to make any headway in meeting its commitments the old idea of single-storey buildings would have to be abandoned. The only practical solution was multi-storey buildings.

The whole scheme covers 26 blocks of three-storey junior grade housing, each containing 72 dwellings, and ten blocks of senior grade housing, each containing 12 dwellings. It will be completed in approximately six years. Provision has also been made for schools, a market and a social centre. The project is under the general direction of the Chief Engineer, the layout and design of the buildings were the responsibility of the Architect and Land Planning branches of the Chief Engineer's department, and the construction has been carried out by the District Engineer's staff in Nairobi. Except for the European inspectors of works, acting as supervisors, the construction is being carried out entirely by Africans. Different colours have been used for the interiors of the rooms.

Each block is in the form of a letter H, with two buildings of residential quarters connected centrally by an ablution and lavatory block. The transverse walls running across the legs of the H are load-bearing and constructed of stone. These in turn support T-shaped reinforced concrete floor beams into which are fitted hollow concrete floor units. The external walls are non-load-bearing and hollow concrete lightweight blocks have been used, suitably water-proofed. There are over 14,000 floor and wall blocks in one 72-unit quarter.

HURST NELSON & CO. LTD.—The directors of Hurst Nelson & Co. Ltd. have resolved to pay the following dividend on May 15 next:—On the 6 per cent Cumulative Preference Shares, the dividend for the half year ending May 15, 1953, less income tax.

Mr. A. Dalton, General Manager, E.A.R. & H. (second from right), welcoming Alderman J. R. Gregory, Mayor of Nairobi, to the official opening of the flats. Also in the group are Messrs. T. W. Eydes, District Engineer, and W. Urquhart, Chief Engineer, and the African foremen on the site

Accident at Stratford, London Transport Executive

An accident which took place at Stratford on the Central Line of London Transport on April 8 caused the death of 10 passengers. Seven were seriously injured, and between twenty-five and forty slightly injured. It occurred in the eastbound tube tunnel a short distance east of Stratford Station at 6.56 p.m., when a train bound for Epping ran into the rear of a stationary train bound for Hainault. Both trains were well loaded. The first two cars of the Epping train were severely damaged. Rescue work was made difficult by the confined space and because all passengers from the trains had to be brought through the tunnels to Stratford and Leyton Stations. The casualties occurred mainly in the first two cars of the Epping train, the motorman of which was among those seriously injured. Rescue, medical and breakdown services were quickly on the scene.

The cause of the accident is not yet made known. An investigation was carried out by London Transport and Colonel D. McMullen opened the Ministry of Transport inquiry on April 16.

Sir Gilmour Jenkins, Permanent Secretary to the Ministry of Transport, sent a letter to Lord Hurcomb, Chairman of the British Transport Commission, in which he said: "In the Minister's absence abroad I am writing to you on his behalf and on behalf of all my colleagues in the Ministry of Transport to say how sorry we were to hear of the accident between Stratford and Leyton on the Central Line yesterday evening. During the many years in which the Underground system has carried millions of passengers a day, the excellent safety arrangements have been extremely successful in preventing accidents of this sort, and I believe one has to go back to 1938 to find a collision in which passengers have been killed underground. I am sure that the public will find some consolation in your previous safety record." Lord Hurcomb replied expressing the gratitude of the Commission for Sir Gilmour Jenkins's message.

The Eastern Region anticipated that traffic diverted from the Central Line would fall on two routes, the Liverpool Street-Chingford line to some extent, and, more heavily, the Liverpool Street-Shenfield electric line. It was clear that the emergency would last only between 24 and 48 hr. and on this understanding the Mechanical & Electrical Engineer, Eastern Region, agreed to forego the inspection of three electric trains during the morning and evening peak for the duration of the emergency.

On the morning of April 9, three stand-by trains were held in readiness; in fact, one only was used. About 2,000 extra people travelled from Ilford and Seven Kings and were cleared mainly by the normal services with the addition of a special stop at Ilford by the 7.37 a.m. Southend Victoria-Liverpool Street.

For the evening traffic additional express electric trains were run between Liverpool Street and Ilford, giving a ten-minute express electric service to Ilford from 4.56 to 6.46 p.m., and the six trains an hour non-stop from Liverpool Street to Seven Kings called at Stratford. The capacity of this extra service to Ilford was expected to be some 12,000 persons in the two principal hours of the peak—approximately 60 per cent of the normal estimated carryings of the Central Line.

Over 7,000 additional passengers were carried between Liverpool Street and Ilford

without congestion, and timekeeping was exemplary.

On the morning of April 10, the same stand-by arrangements were made at Ilford as on the Thursday morning, but the demand was not as great as on the previous night. Two stand-by trains were used and one Southend train stopped specially at Ilford. The total additional traffic on this day was some 4,000 persons.

B.T.C. Charges Scheme Before Tribunal

When the Transport Tribunal resumed its inquiry on April 14 into the B.T.C. Passenger Charges Scheme, 1953, Mr. S. W. Hill, for the Middlesex County Council, agreed with Mr. Harold Willis that the estimates which the Commission had put forward for London Transport showed there was a need for substantial additional revenue. He disagreed, however, with the estimate of receipts for "Y" year—a period of 12 months beginning about mid-1953; he thought a period of three months too short on which to base a calculation, and suggested that this should be widened to one of at least 12 months.

The estimate for "Y" year was too low, thought Mr. Hill, because Mr. Valentine used the months of September, October and November last year, which included one of the country's worst Septembers so far as weather was concerned. He thought the year 1952 was the best basis.

Mr. Harold Willis, Q.C., for the B.T.C., dealt with Mr. Hill's contention that an average of £500,000 was overcharged by London Transport for maintenance in each of the past five years. He pointed out that accounts of the London Transport Executive were included in those for the B.T.C. as a whole and were annually audited. In the 1951 accounts the auditors stated they had obtained all the explanations, and remarked that in their opinion the accounts gave a true and fair view of the year 1951.

Dealing with "trends of expenses" in "Y" year, Mr. Willis asked whether Mr. Hill's view was that expenses would be increased, and witness replied he did not think so; he thought that, taking the combined effect of wholesale price changes—some going down and some going up—the present position was likely to be the fair level of average over the next year.

In later examination, Mr. Hill was asked whether there was any reason in his view why any given activity should not be able to pay its share of the interest in the central charges if that share was apportioned on the basis of its fixed assets? He replied in the negative, but said that did not mean that each and every undertaking in each year had to pay its way.

The Tribunal adjourned until Wednesday.

Parliamentary Notes

Channel Tunnel

Mr. Nigel Birch, Parliamentary Secretary to the Ministry of Defence, said in answer to a question on April 1 that Allied Supreme Headquarters in Europe had neither approved nor given any official consideration to a railway or road Channel Tunnel.

London Helicopter Station

In answer to a question Mr. J. D. Profumo, Parliamentary Secretary to the Ministry of Civil Aviation, said on April 2 that Charing Cross Station had certain disadvantages as a helidrome compared with Waterloo; it was, for example, too narrow, so that building a helidrome would mean encroaching on open space on either side of the railway bridge.

Air Passengers' Service Charge

Mr. J. D. Profumo, Parliamentary Secretary to the Ministry of Civil Aviation, answering a question on April 1 said that the passenger service charge at airports had yielded £185,000 during the eleven months it had been in operation in 1952-53. It was intended, he added, to carry on with the charge, but the Minister hoped to find some way in which it was not so troublesome to passengers as they were leaving the airport.

Contracts & Tenders

The Railway Executive has placed an order with the North British Locomotive Co. Ltd., Glasgow, for three 200 h.p. diesel-mechanical shunting locomotives for use in the North Eastern Region. These engines will be of the 0-4-0 type with a total weight of 32 tons and length over buffers of 22 ft. 11½ in. They will incorporate the Voith-North British system of hydraulic transmission which avoids the use of a gear box.

A French industrial group comprising Alsthom, Schneider, Jeumont and Société Parisienne pour l'Industrie Electrique, has been awarded a contract for the electrification of the suburban section of the main line of the Turkish State Railways from Istanbul to Pythion, the frontier station on the Greek side of the Turkish border. The contract envisages an expenditure of U.S. $7,500,000, and the 50-cycle system is to be adopted. From Istanbul the suburban services extend as far as Catalca (Chataldja), a distance of 44 miles.

British Railways, Western Region, have placed the following contracts:—

Alfred Bagnall & Sons Ltd., London, W.12: Painting No. 2 roof span of Paddington passenger station.

W. G. Beaumont & Son, London, E.3: Painting Ealing Broadway station.

W. H. Streeter Limited, Hampton: Painting the passenger station and goods depot at Twyford and cleaning stations in the Wolverhampton district.

Quick Brothers, Newport, Mon.: Painting the passenger and goods stations at Hereford Barrs Court.

J. J. Hamilton & Sons, Oxford: Painting Reading General passenger station and buildings between and including the East and West signalboxes, and repairs.

Adlon Erectors Limited, London, S.W.20: Painting the passenger station and general offices at Marylebone and the passenger station and goods depot at Ashchurch.

Contractors interested in tendering for a railway construction contract on the Gold Coast are asked to communicate with Messrs. Rendel, Palmer & Tritton, of London, S.W.1. Particulars are given under Official Notices on page 467.

The New Zealand Government Offices in London report that an invitation to tender has been issued on behalf of the Railways Department in New Zealand for the supply of ten diesel-mechanical shunting locomotives 250 h.p. to N.Z.R. Specification No. 435/1.

Tender documents and drawings are available at the New Zealand Government Offices. The tender, ref. No. C/F.99/128, closes with the New Zealand Government Offices, Purchasing Branch, Adelphi (Ground Floor), John Adam Street, London, W.C.2, at noon on April 30.

The Special Register Information Service of the Board of Trade, Commercial Relations & Exports Department, reports that the Commercial Attaché, British Embassy, Brussels, has notified a call for tenders issued by the Belgian National Railways for 250 sets of direct current electric point-changing apparatus.

Tenders should reach the Société Nationale des Chemins de fer Belges, Direction du Materiel et des Achats, Bureau 26-51—Section 9, 17 Rue de Louvain, Brussels, by 10 a.m. on April 22.

A copy of the tender notice (in French) is available on loan in order of application. Reference CRE/12354/53 should be quoted.

The Special Register Information Service of the Board of Trade, Commercial Relations & Exports Department, reports that the United Kingdom Trade Commissioner at Delhi has notified a call for tenders issued by the Directorate General of Supplies & Disposals, Government of India, for:—

Six broad gauge motor trolleys, inspection type, broad gauge.

Each trolley should be suitable for use on all broad gauge Indian railways for carrying out inspection work on the line. The frame is to be of aluminium alloy, heat treated and bolted, and spring mounted. Steel axles and roller bearings are to be fitted. The seating capacity is three men on seat and three on rear deck of specially treated wood.

Load capacity 1200 lb.

Wheels demountable, 16 in. by ¼ in. by 40 in. base, with adjustable four-wheel brakes.

Prime mover and accessories: 5 to 8 h.p. petrol engine, single cylinder, water cooled, battery and coil ignition, equipped with a generator and lights, fuel tank, control and driver gear, and other standard accessories.

Weight 600-750 lb.

Tenders should reach the Director General of Supplies & Disposals, Shahjahan Road, New Delhi, by 10 a.m. on April 27.

A copy of the tender documents may be inspected at the Board of Trade. A further copy is available on loan. Reference CRE/12200/53 should be quoted.

The Director-General of Supplies & Disposals, Railway Stores Directorate, New Delhi, is inviting tenders for the following:—

180 plungers for buffer steel II and III.

450 plungers and spindles complete for coaching and wagon underframes "OC" type wagons.

220 plungers and spindles complete for "OC" type wagons.

Tenders are to be submitted to the Director-General of Industries & Supplies, Shahjahan Road (Section SRI), New Delhi, quoting reference SRI/16193-D/III and will be opened at 11.30 a.m. on May 5. Forms of tender are only available for purchase in India from the Deputy-Director General (Supplies), Directorate General of Supplies & Disposals, New Delhi; Director of Supplies & Disposals, Bombay or Calcutta, and Deputy Director of Supplies & Disposals, Madras.

The Special Register Information Service of the Board of Trade, Commercial Relations & Exports Department, reports that the United Kingdom Trade Commissioner at Delhi has notified a call for

tenders issued by the Directorate General of Supplies & Disposals, Government of India, for:—

200 railway carriage fans d.c. 24 volts, 16-in. sweep, ceiling type complete with blades, close-mesh type fan guard, regulator and resistance box, ceiling fitting of swivelling type.

Tenders should reach the Director General of Supplies & Disposals, Shahjahan Road, New Delhi, by 10 a.m. on May 26. A copy of the tender documents is available on loan from the Board of Trade. Reference C.R.E./12198/53 should be quoted.

Notes and News

Vacancies for Civil Engineers.—Applications are invited for the posts of civil engineers, single men under 25 years of age, and married men not exceeding 30 years of age, required in the Chief Civil Engineer's Department of the Rhodesia Railways. See Official Notices on page 467.

London Midland Region Station Closings.—On April 6 Annesley and Clifton Mill stations of the London Midland Region were closed, and Breadsall Station was closed except for freight traffic. On the same day Whitegate Goods Depot, between Cuddington and Winsford, was closed.

Canadian International Trade Fair.—Bookings for 56,000 sq. ft. of stand space at the forthcoming Canadian International Trade Fair in Toronto have been taken by United Kingdom exhibitors. The fair will be held from June 1 to 12. British exhibits will cover a wide range of products, from chemicals and office equipment to electrical apparatus, machine tools, and hand tools. A general review of British products and services will be provided by a display of 55 technical publications grouped under ten headings representing various industries. Our associated publication, *Diesel Railway Traction*, will be shown in the Transport Section. Other Tothill Press and associated publications on the stand will be *Colliery Engineering*, *Machinery Lloyd* (special issue to Canada and Overseas Edition), *New Commonwealth*, *Shipbuilding & Shipping Record*, *Water Power* and *Wood*.

North Tyneside Electric Service.—The Summer timetable of the North Eastern Region will include a 20 min. Sunday service on the North Tyneside electric lines. Passengers from Newcastle to Tynemouth, Cullercoats, Whitley Bay, and Monkseaton will thus have from June 14 a train every 10 min. via Jesmond or via Wallsend, from 9.55 in the morning to 11.5 p.m.

Rawlings Window Display in Amsterdam.—Mr. D. H. N. Dutfield, of the Rawlings Manufacturing Co. Ltd., accompanied by Mr. H. W. Hudson, Chief Designer, will be flying to Holland for the Dutch Commercial Motor Show, April 23 to May 2, where the company's windows will be exhibited. They are to meet many of their European friends in the transport world in Amsterdam.

New Internal Air Routes.—The Minister of Civil Aviation, Mr. Alan Lennox-Boyd, has approved, subject to certain conditions, the operation of internal air services on the following routes: Blackpool-Jersey, by Lancashire Aircraft Corporation Limited; West Hartlepool-London, by B.K.S. Aerocharter Limited; and Derby-Jersey, via Wolverhampton, by Derby Aviation Limited. An inclusive tour between London and Lourdes by Trans-air Limited, also has been approved.

British Railways Ambulance Contest, London Midland Region.—The Final Ambulance Competition for teams in the London Midland Region will be held in the King's Hall, Belle Vue, Manchester, on Friday, April 24, commencing at 9.30 a.m. Mr. F. A. Pope, Member of the British Transport Commission, and Mr. J. W. Watkins, Chief Regional Officer, L.M.R. will attend the competition and Mrs. Pope will present prizes to the successful competitors. Mr. R. Simpson, Regional Staff Officer, L.M.R., will be in the chair.

B.T.C. Visit to Scotland.—Lord Hurcomb, Chairman of the British Transport Commission, accompanied by Members of the Commission, will visit Scotland next week in order to hear the views of various authorities and representative bodies on the proposed reorganisation of the railways.

Railway Postcards at M.R.C. Exhibition.—The display of railway postcards at the recent Model Railway Club Exhibition to which we referred on page 439 of our April 10 issue, was from the collection of Mr. V. Stewart Haram, and was not exhibited by the Railway Club as then stated.

Universal Circle Cutting Machine.—A hand-operated circle cutting machine has been evolved by Harmans Engineering Company. The machine will cut rings and discs up to 11½ in. dia. in many materials, including glass, paper, cork, felt, and rubber. It consists of a baize covered turntable mounted on a cast base. An overhead bar carries a cutter head which can be locked at any radius from the centre of the table, and also a removable centre head which is used to locate and clamp material. Interchangeable cutters, including a glass cutter, are provided for different materials. The overhead bar can be removed for spraying articles if required.

Swedish Lloyd Summer Services.—During the summer there are two to four sailings a week either way between Tilbury and Gothenburg by the m.s. *Saga* and s.s. *Britannia*, *Patricia* and *Suecia*, the voyage taking some 36 hr. The "Swedish Lloyd Special" leaves St. Pancras for Tilbury Riverside at 3.30 p.m.; on double sailing days the second boat train will leave at 4.25 p.m. The "Londonpilen" ("London Arrow") high-speed electric train between Gothenburg and Stockholm will run to and from the London Pier, Gothenburg, from June 10 to September 30.

Crossing Keeper Accused of Manslaughter.—The keeper of Pandy Lane crossing, on the Bangor-Caernarvon line, London Midland Region, where a man was killed on March 31 when a train from Bangor struck his lorry, has been charged with manslaughter. The lorry was carried along the line and the body of the dead man found on the engine buffers.

Summer Weekend Reservations from Torquay Line Stations.—The scheme introduced last summer by the Western Region, whereby passengers for Paddington travelling on Saturdays from stations in the Torbay area were assured of a seat in specified trains, will be reintroduced this year on Saturdays, June 13 to September 19 inclusive, and will be extended to cover certain expresses from Kingswear, Paignton, and Torquay to Birmingham, Wolverhampton, Sheffield and Nottingham. Special reservation tickets, without which passengers will not be permitted to board the specified trains, will be issued free of charge in advance to holders of rail tickets on application to any station or agency. Applications made within three weeks of the date of travel should be addressed to the Torquay

Inaugural Journey of "Starlight Special"

Scene on platform 4 at Marylebone before departure of the inaugural "Starlight Special" to Edinburgh on April 10. Mr. David Blee, Member, the Railway Executive, is shaking hands with the driver of the Pacific locomotive "Enterprise"

OFFICIAL NOTICES

The engagement of persons answering Situations Vacant advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 *inclusive or a woman aged* 18-59 *inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order,* 1952.

REQUIRED by the Central Railway of Peru two Locomotive Assistants preferably single and between 26/30. Qualifications. Full apprenticeship with British Railways or Locomotive Builders and experience in one or more of the following: Railway Machine Tool Operation. Welding Boiler works, Locomotive Running or Drawing Office. Also two fully trained Steam Locomotive Engineers aged between 30/45. Experience preferably in South America with locomotive running or locomotive workshops in supervisory positions. A.M.I.Mech.E., desirable and knowledge of Spanish essential. Apply SECRETARY, PERUVIAN CORPORATION LTD., 144, Leadenhall Street, London, E.C.3.

N.E.R. HISTORY.—Twenty-Five Years of the North Eastern Railway, 1898-1922. By R. Bell, C.B.E., Assistant General Manager, N.E.R. and L.N.E.R. Companies, 1922-1943. Full cloth. Cr. 8vo. 87 pages. 10*s.* 6*d.*—*The Railway Gazette*, 33, Tothill Street, London, S.W.1.

INTERNATIONAL RAILWAY ASSOCIATIONS. Notes on the work of the various associations concerned with International traffic, principally on the European Continent. 2*s.* By post 2*s.* 2*d.* *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

RHODESIA RAILWAYS

VACANCIES FOR CIVIL ENGINEERS

VACANCIES exist for fully qualified Civil Engineers for service in the Chief Engineer's Department of the Rhodesia Railways. Preferably single men under the age of 25 years will be considered, but married men not exceeding 30 years of age may apply. A Degree in Civil Engineering and/or Corporate Membership of the Institution of Civil Engineers is essential. The grades of Junior and Assistant Engineer have salary scales between the limits of £560 and £1,460 per annum, with incremental notches of £40 per annum and the commencing salary would be determined in accordance with age and experience. The vacancies are for appointment to the Temporary Staff in the first instance, but transfer to the Permanent Staff may be made to fill vacancies and on the recommendation of the Chief Engineer. Vacancies may occur later on for members of the Permanent Staff for the grade of District Engineer by selection within the scale £1,350 to £1,750 per annum. All salaries are enhanced by a variable Cost of Living allowance, which at present is 18% on basic rates. Full particulars may be obtained from THE LONDON AGENT, Rhodesia Railways, 241, Salisbury House, London Wall, London, E.C.2. Applications should reach the London Agent by April 30, 1953.

BOUND VOLUMES.—We can arrange for readers' copies to be bound in full cloth at a charge of 25*s.* per volume, post free. Send your copies to the SUBSCRIPTION DEPARTMENT, Tothill Press Limited, 33, Tothill Street, London, S.W.1.

GOLD COAST RAILWAY CONSTRUCTION

WILL ANY CONTRACTORS from the United Kingdom or Overseas interested in tendering for a large railway construction contract in the Gold Coast please communicate with the Consulting Engineers, Messrs. Rendel, Palmer & Tritton, 125, Victoria Street, London, S.W.1. Competitive tenders will be invited on a schedule of approximate quantities the value of the contract immediately in view being in the region of 1½ million to 2 million pounds. Any contractors wishing to tender will be expected to supply substantial evidence of their financial standing and of their ability to undertake large civil engineering works overseas.

DEPUTY TRAFFIC MANAGER required by large industrial firm in the Midlands; good prospects. Railway experience of rates, charges and wagon control essential. Knowledge of shipping and road transport also desirable. Contributory Superannuation Scheme in operation. Applicants should be under 55 years of age. Applications stating age, details of previous experience and salary required to Box 803, *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

ACCOUNTANT (TRAFFIC AUDITOR) required by the Central Railway of Peru—about 30 years of age, preferably single, with general auditing and railway accounting experience, knowledge of Spanish desirable but not essential. Apply—THE SECRETARY, PERUVIAN CORPORATION LTD., 144, Leadenhall Street, London, E.C.3.

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line station at which the journey is to begin. Usual seat reservation facilities from stations in the area will be cancelled on the Saturdays covered by the scheme.

Railway Ships for Coronation Review.—Among the merchant ships taking part in the Coronation Review in Spithead will be British Railways s.s. *Amsterdam* which normally works on the Harwich—Hook of Holland service. The Commonwealth Relations Office has chartered the British Railway steamers *Shanklin* and *Lord Warden* for the accommodation of official guests from the Commonwealth; these ships will be anchored in the Review lines. The twin-screw vessel *Shanklin* normally plies between Portsmouth and Ryde, and the motor-carrier *Lord Warden* between Dover and Boulogne.

Opening of Drumry Station, Scottish Region.—A new station, Drumry, situated between Drumchapel and Singer stations on the Glasgow-Helensburgh line, Scottish Region, was officially opened on April 6. The ceremony was presided over by Provost A. W. Braes, Clydebank, who after an introductory speech invited Mrs. T. F. Cameron, wife of the Chief Regional Officer, to cut a silk ribbon extended across the station entrance. The new station premises consist of passenger accommodation, booking office and staff rooms on the Glasgow departure platform. On the Dumbarton departure platform waiting rooms are also provided, and on both sides there are overhead canopies extending the length of each platform building. Drumry Station serves the needs of new housing schemes located on both sides of the railway.

English Steel Corporation Exhibit at B.I.F.—A full-size model of an ingot 26 ft. × 10 ft. 4 in. will be exhibited by the English Steel Corporation Limited at its stand at the British Industries Fair, Castle Bromwich; as the original weighs 270 tons, it could not be shown. The ingot is the first of a number to be forged under a 7,000-ton electro-hydraulic press into high pressure one-piece boiler drums, 42 ft. long and 6 ft. 2¼ in. outside dia. for new power stations being built for the British Electricity Authority by Clarke Chapman & Co. Ltd., Gateshead. Steel for the ingot came from four acid open hearth Siemens furnaces and apart from the high technical skill required in casting, lifting and transport set many problems. When stripped from its mould the ingot was loaded on to a 300-ton, 24-wheel railway wagon and taken to another department for further processing.

E.R. Mutual Improvement Classes Competition.—The final of the Eastern Region Mutual Improvement Classes Competition was held on March 26 at the Liverpool Street Station Gymnasium. Langwith Motive Power Depot was the winner, obtaining 60½ marks out of a possible total of 72, but was given a hard fight by Cambridge who had 59. In last year's contest the Cambridge team defeated Langwith by one mark. Mr. C. K. Bird, Chief Regional Officer, presented members of the winning team with prizes, and they will now go forward to the British Railways semi-final.

Sheffield Victoria Station Roof.—The first stage in construction of the permanent roof for Sheffield Victoria Station (see our April 3 issue) was carried out on March 22. This consisted of erecting nine concrete beams to span the three tracks running between platforms 3 and 4. A steel lifting beam weighing about 12 tons was used by the contractor, Wellerman Bros. Ltd., to lift the nine beams, one of which, weighing 16½ tons, will eventually carry the overhead electrical equipment when the Manchester—Sheffield line is electrified. A 36-ton steam crane from Colwick worked from the centre track and the train carrying the beams stood on the line by platform 4. All nine beams were erected after about 6 hr. work. It is expected that the remaining eight beams will be placed in position on Sunday, May 17.

Bakelite Plastics at the B.I.F.—The aim of the Bakelite Limited stand at the B.I.F. this year is to demonstrate the versatility of Bakelite Limited by showing the range of materials supplied and a wide selection of industrial applications. Four giant test tubes will emphasise the scientific origin of the materials, and around will be displayed Bakelite phenolic and urea resins and moulding materials, laminated sheet, rod, and tube, and the Vybac group of thermoplastic compounds for extrusion and injection moulding, and soft and rigid calendered sheet. The Warerite range of decorative laminates for wall panelling and furniture will also be on view. An outer ring of finished articles completes a theme which starts logically in the laboratory where the resins are first brought into being, and ends in the industrial uses.

Record Pig Iron Production.—The British Iron & Steel Federation states that steel output in March was at the rate of 351,400 tons a week, exceeding the previous best rate for that month, 329,800 tons a week in March, 1950. The production of pig iron again increased and the current rate of 215,700 tons a week is the highest yet achieved; the previous best rate was 213,900 tons a week in January of this year. During the first quarter of 1953 total steel production has amounted to 4,552,000 tons. The previous best output in a quarter was 4,261,000 tons in the fourth quarter of 1952.

New Huskisson Goods Depot, Liverpool.—Work is in progress on a new goods depot at Huskisson, Liverpool, which will be one of the most modern in the country. The depot, measuring 450 ft. by 135 ft. will enable goods to be handled more speedily and efficiently. Packages will be taken from the wagons and placed on an electric conveyor. Those for town handling will be taken off the conveyor at the appropriate points and loaded on to road delivery vehicles, and traffic requiring to pass through the warehouse or to "wait order" will be taken off the conveyor at a dock adjoining the shipping warehouse. The depot will cost £200,000.

Signalling Company's Progress. — The statement by the Chairman, Captain A. R. S. Nutting, issued with the report and accounts of the Westinghouse Brake & Signal Co. Ltd., records satisfaction with the trading profits for the year to September 27 last. In spite of the group trading result of £1,183,732, taxation deprived the Company of no less than £720,843. In his review of the divisions, the Chairman mentioned the resignalling at Euston carried out by the Signalling and Colliery Divisions in conjunction with the London Midland Region. The Rectifier Division had excelled itself in the year under review and its actual net despatches were over 33½ per cent greater than for the previous year.

In general he thought that the current period should be satisfactory although results were bound to be affected by certain features such as wage increases over which they had no control.

L.M.R. Fire Brigade Finals.—Mr. J. W. Watkins, Chief Regional Officer, L.M.R., on April 8 presented the regional shields and cash awards to the successful teams in the Region's fire brigade and hydrant drill championship contests. The winners, Heysham Harbour (trailer pump) and Westhouses (hydrant drill), now go forward as London Midland champions to the all-regional final in London.

British Railways Amateur Boxing Tournament.—The Inter-Regional Finals of the British Railways Amateur Boxing Championships are being held tonight at the Royal Albert Hall, London, beginning at 7 p.m. Mr. John Elliot, Chairman of the Railway Executive, will preside and present the awards to the winners. The finals in all ten recognised weights will be preceded by the semi-finals of the bantam, welter, and light-middle weights.

United of Havana Discussion.—The group of Cuban cabinet members and Government officials composing the commission entrusted to consider the position of the British-owned United of Havana Railways met President Batista of Cuba on April 13. While no information was disclosed concerning the subjects discussed, it was believed that the purchase of the railway either by the Cuban Government or private Cuban interest was given detailed attention. Reference to the effect of these developments on United of Havana stocks is made in our Stock Market columns on this page.

Wagon Finance Corporation.—The 1952 turnover of the Wagon Finance Corporation is stated to be a record, and the outlook for 1953 "not unpromising." The consolidated profit rose from £162,000 to £201,000, but largely because of E.P.L. the net profit at £52,000 is only £4,000 higher than for the previous year. By paying the equivalent of 15 per cent on the one-class capital as increased to £250,000 by last year's 100 per cent scrip bonus, the effective rate is increased by 2½ per cent.

Superheater Co. Ltd.—The Directors of the Superheater Co. Ltd. announce that the profit for the year ended December 31, 1952, inclusive of interest was £6,142 (£6,247), and after providing for taxation of £220,018 (£205,541) amounted to £179.189 (£164,412). To this profit must be added provisions made in the past years no longer required £71,862 (nil) and balance brought forward from previous year £75,622 (£57,938), making the available profit £326,673 (£222,350). Capital Reserve £43,800 (nil), Revenue Reserves £145,000 (£93,000) and expenses written off nil (£2,241). Net dividends of £20,240 (£20,240) were paid during the year as follows:—5½ per cent Preference Stock £6,352 (£6,352), Interim Dividend of 6d. per Share less tax on 1,058,100 Ordinary and "A" Ordinary Shares £13,888 (£13,888). A second and final dividend of 1s. 3d. per share, less tax at 9s. 6d., on 1,234,800 ordinary and "A" ordinary shares is recommended, absorbing £40,517 net (£31,247), making a total distribution for the year on the ordinary and "A" ordinary shares of £54,405 (£45,135). Balance carried forward is £77,116 (£75,622).

Forthcoming Meetings

April 18 (*Sat.*).—British Railways, Southern Region, Lecture & Debating Society: Visit to National Physical Laboratory. Party limited to twenty.

April 18 (*Sat.*).—The Permanent Way Institution, Leeds & Bradford Section: Visit to Newcastle, Park Lane Permanent Way Shops, Gateshead, North Eastern Region.

April 21, 22 and 23 (*Tue., Wed.* and *Thu.*).—The Public Transport Association Folkestone Conference.

April 23 (*Thu.*).—Locomotive & Carriage Institution of Great Britain & Eire, in the Railway Clearing House Board Room, 163, Eversholt Street, London, N.1, at 7 p.m. Paper on "Gas Turbine Locomotives," by Mr. A. W. J. Dymond.

April 23 (*Thu.*).—Engineers' Guild Limited Metropolitan Branch, at Caxton Hall, Westminster, S.W.1, at 6 p.m. Discussion on "Freedom in Engineering," by Mr. A. Floyd, County Surveyor for West Sussex.

April 24 (*Fri.*).—British Railways, Western Region, London Lecture & Debating Society, at the Headquarters' Staff Dining Club, Bishop's Bridge Road, Paddington, W.2, at 5.45 p.m. Debate with the Federation of Railway Lecture & Debating Societies, North Eastern Region, on "That Nationalisation Tends to Develop the Mediocre rather than the Outstanding Railwayman."

April 25 (*Sat.*).—Stephenson Locomotive Society, North Western Area, and the Manchester Locomotive Society: High Peak Rail Tour.

April 29 (*Wed.*).—Institution of Locomotive Engineers at the Institution of Mechanical Engineers, Storey's Gate, London, S.W.1, at 5.30 p.m. Informal Discussion on "Operating Problems on Colonial Railways.

May 1, 2 and 3 (*Fri., Sat.*, and *Sun.*).—Institute of Traffic Administration, Annual Conference, Royal Beach Hotel, Southsea.

May 1 (*Fri.*).—The Railway Club, at 57, Fetter Lane, London, E.C.4, at 7 p.m. Paper on "Suburban Traffic Operation," by Mr. C. F. Klapper.

Railway Stock Market

As was to be expected, stock markets have been dominated by the Budget, and for the time being sentiment has been influenced only to a moderate extent by the prospect of peace in Korea. Nevertheless, the further fresh fall in the price of tin, which has now declined by more than £200 per ton in a fortnight, and the easier tendency in prices of other metals and commodities provide a warning that if there is a cease-fire in Korea and slowing down in rearmament later in the year, there may be big adjustments in stock markets. Moreover, the tendency in markets is to try to discount the future a long way ahead. The big fall in the price of tin shows this, because buyers tend to go slow for the time being. Lower metal and commodity prices mean reduced costs for industry, so that if hopes for Korea are realised there may be much switching into industrial shares from shares of commodity companies and base metal mines.

Foreign rails have attracted only a limited amount of attention this week, and price movements were small and indefinite in character.

Buyers were about for Antofagasta preference stock, which has strengthened to 46½ at the time of going to Press, while the ordinary stock had a firmer appearance at 9¼.

There was again a good deal of business in White Pass & Yukon no par value shares, which at $33¼, however, failed to keep best levels, while the 5 per cent convertible debentures were £115. Despite the recent sharp reaction in the shares and debentures many holders still have very good profits. Prices could go substantially higher if the much-talked-of, but unconfirmed, rumour of an offer by U.S.A. interests were eventually to come along. Many brokers are advising holders who have a good profit at the current price of the shares to sell part of their holding and retain the balance, awaiting any future developments.

An active feature has also been Costa Rica ordinary stock, which touched nearly 15 before profit-taking brought a partial reaction to 13. The 6½ per cent second debentures changed hands around 57. Chilian Northern 5 per cent first debentures marked 25½.

Although best levels were not held, the speculative interest in "Iron Curtain" bonds continued to extend to the old Russian railway bonds. Russian South Eastern marked 15s. and Armavir-Touapse 25s.

Elsewhere, Guayaquil & Quito 5 per cent bonds have changed hands at 40¼, and International of Central America 5 per cent bonds at 146.

Nyasaland Railway 3½ per cent debentures were dealt in around 72. Among Indian stocks, Barsi were dealt in around 120.

Canadian Pacifics eased to $51, while the 4 per cent preference was £65 and the 4 per cent debentures £81¼.

Manila Railway issues were less active but steadier with the "A" debentures 86 and the preference shares 8s. 9d. Mexican Central "A" debentures eased to 67. San Paulo units, though active, have not kept best levels at 6s. Nitrate Rails shares were 20s. 6d.

There was a fair amount of business in United of Havana issues, which, however, left prices little changed on balance, the "A" stock being 63½, the "B" 56, the second income stock 20¾, and the consolidated stock 3¼.

Road transport shares have displayed firmness, with Southdown at 32s. 6d., West Riding 34s. 3d., and Lancashire Transport 46s. 6d. East Kent marked up to 25s. 9d. and Devon General 28s. 6d. B.E.T. deferred stock rose to £495.

Engineering and kindred shares have moved fairly closely with the general trend of markets. At the time of going to press, Vickers have recovered to 47s. and Cammell Laird 5s. shares at 13s. 9d. have also been firmer, awaiting the financial results. Guest Keen were 52s. 6d., T. W. Ward 73s. 3d., Tube Investments 59s. 9d., Ruston & Hornsby 40s. 6d. and Babcock & Wilcox showed firmness at 71s. 6d. on higher dividend hopes.

Among shares of locomotive builders and engineers, Beyer Peacock were 36s. 3d., Hurst Nelson 41s. 3d., North British Locomotive 15s. 3d. and Birmingham Carriage 31s. 7½d. Vulcan Foundry eased to 22s. 6d., Gloucester Wagon 10s. shares were 12s., Charles Roberts 5s. shares 14s. 4½d. and Wagon Repairs 5s. shares 12s. 1½d. Central Wagon changed hands around 67s. 9d.